Curriculum Book

and

Assessment and Evaluation Scheme

based on

Outcome Based Education (OBE)

and

Choice – Based Credit System (CBCS)

in

Bachelor of Science [Information Technology]
(Honours)
B.Sc. IT (Hons.)

4 Year Degree Program

Revised as on 01 August 2023
Applicable w.e.f. Academic Session 2023-24

AKS University

Satna 485001, Madhya Pradesh, India

Faculty of Computer Applications & Information Technology and Sciences
Department of Computer Application & Information Technology

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A K S University, Satna

Faculty of Computer Applications & Information Technology and Sciences

Department of Computer Application & Information Technology

Curriculum & Syllabus of B.Sc. IT

(Bachelor of Science in Information Technology) Program

(Revised as of 01 August 2023)

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A K S University

Faculty of Computer Application & Information Technology and Science
Department of Computer Application & Information Technology
Curriculum of BSC (IT) (Bachelor of Science)
(Revised as on 01 August 2023)

Foreword

I am thrilled to observe the updated curriculum of the Computer Application & Information Technology Department for the B.Sc. IT (Bachelor of Science in Information Technology) Program, which seamlessly integrates the most recent technological advancements and adheres to the guidelines set forth by UGC. The revised curriculum also thoughtfully incorporates the directives of NEP-2020 and the Sustainable Development Goals.

The alignment of course outcomes (COs), Programme Outcomes (POs), and Programme Specific Outcomes (PSOs) has been intricately executed, aligning perfectly with the requisites of NEP-2020 and NAAC standards. I hold the belief that this revised syllabus will significantly enhance the skills and employability of our students.

With immense satisfaction, I hereby present the revised curriculum for the B.Sc. IT (Bachelor of Science in Information Technology) program for implementation in the upcoming session.

Er. Anant Soni

Pro Chancellor & Chairman

AKS University, Satna

01 August 2023

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application & Information Technology

Curriculum of BSC (IT) (Bachelor of Science)

(Revised as on 01 August 2023)

From the Desk of the Vice-Chancellor

AKS University is currently undergoing a process to revamp its curriculum into an outcome-based approach, to enhance the teaching and learning process. The foundation of quality of quality education lies in the implementation of a curriculum that aligns with both societal and industrial needs, focusing on relevant outcomes. This entails dedicated and inspired faculty members, as well as impactful industry internships. Hence, it is of utmost importance to begin this endeavor by crafting an outcome-based curriculum in collaboration with academia and industry experts. This curriculum design should be Informed by the latest technological advancements, market demands, the guidelines outlined in the National Education Policy (NEP) of 2020, and sustainable goals.

I'm delighted to learn that the revised curriculum has been meticulously crafted by the Computer Application & Information Technology Department, in consultation with an array of experts from the Computer Science industry, research institutes, and academia. This curriculum effectively integrates the principles outlined in the NEP-2020 guidelines, as well as sustainable goals. It also adeptly incorporates the latest advancements in Computer Science manufacturing technology.

Furthermore, the curriculum takes into account the specific needs of the Indian Computer Science industry, focusing on the production of cost-effective, high-quality Computer Science. It extends its reach to optimizing power consumption by including insights on waste heat recovery systems utilized in Computer Science plants. This inclusion not only imparts knowledge but also encourages students' independent thinking for potential enhancements in this area.

The curriculum goes beyond theoretical learning and embraces practical applications by incorporating the utilization of industrial and domestic waste in Computer Science production. To enhance students' skills, the curriculum integrates Hands-On Training, industrial visits, on-the-job training experiences, research, and progress. This well-rounded approach ensures that students receive a comprehensive education, fostering their skill development and preparing them for success in the Computer Science industry.

I am confident that the updated curriculum for Computer Application & Information Technology will not only enhance students' technical skills but also contribute significantly to their employability. During the process of revising the curriculum, I am pleased to observe that the Computer Application & Information Technology department has diligently adhered to the guidelines provided by the AICTE. Additionally, they have maintained a total credit requirement of 170 for the B. Tech Computer Application & Information Technology program.

It's worth noting that curriculum revision is an ongoing and dynamic process, designed to address the continuous evolution of technological advancements and both local and global concerns. This ensures that the curriculum remains responsive and attuned to the changing landscape of education and industry. AKS University warmly invites input and suggestions from industry expert technocrats and Alumni students to enhance the curriculum and make it more student-centered. Your valuable insights will greatly contribute to shaping an education that best serves the needs and aspirations of our students.

AKS University, Satna ***Professor B. A. Chopade***

01 August 2023 *Vice-Chancellor*

Preface

As part of our commitment to ongoing enhancement, the Department of Computer Application & Information Technology consistently reviews and updates its BSC (IT) program curriculum every three years. Through this process, we ensure that the curriculum remains aligned with the latest technological advancements, as well as local and global industrial and social demands.

During this procedure, the existing curriculum for the BSC (IT) Program undergoes evaluation by a panel of technocrats, industry specialists, and academics. Following meticulous scrutiny, the revised curriculum has been formulated and is set to be implemented starting from August 01, 2023.This implementation is contingent upon the endorsement of the curriculum by the University's Board of Studies and Governing Body.

This curriculum closely adheres to the UGC model syllabus distributed in 2020. It seamlessly integrates the guidelines set forth by the Ministry of Higher Education, Government of India, through NEP-2020, as well as the principles of Sustainable Development Goals. To foster the holistic skill development of students, a range of practical activities, including Hands-On Training, Industrial Visits, Project planning and execution, Report Writing, Seminars, and Industrial on-the-job training, have been incorporated. Furthermore, in alignment with AICTE's directives, the total credit allocation for the BSC (IT) program is capped at 120 credits.

To ensure a comprehensive learning experience, detailed evaluation schemes and rubrics have also been meticulously provided.

For each course, a thorough mapping of Course Outcomes, Program Outcomes, and Programme Specific Outcomes has been undertaken. As the course syllabus is meticulously developed, various elements such as session outcomes, laboratory instruction, classroom instruction, self-learning activities, assignments, and mini-projects are meticulously outlined.

We hold the belief that this dynamic curriculum will undoubtedly enhance the independent thinking, skills, and overall employability of the students.

Professor Akhilesh A. Waoo
Associate Dean and Head CS/IT

Introduction

AKS University proudly stands as a pioneer, being the first in the nation to introduce a comprehensive 3-year Bachelor of Science in Information Technology (BSc IT) program back in 2012. This innovative curriculum has been meticulously crafted to align with the dynamic needs of the computer and information industry and the most current technological advancements. Currently, a vibrant community of 170 students is actively engaged in pursuing their BSc IT within this department. The Faculty of Computer Applications & Information Technology and Sciences boasts cutting-edge laboratories that serve as hubs for immersive hands-on training, enabling students to delve into practical applications of their learning. The program incorporates both in house training and sandwich apprenticeship training, vital components that enrich the educational journey. Distinguished by a faculty composed of computer industry experts who bring with them a wealth of industrial experience, the department combines robust classroom instruction with practical and industrial acumen. This unique blend empowers our students to confidently contribute to software development and make a significant impact in the field.

Vision

To emerge as power house of information Technology and Allied areas developing competent computer professionals to meet the dynamic needs of disruptive technologies.

Mission

M01: To impart technical knowledge through innovative teaching, research and consultancy

MO2: Provides state-of-the-art facilities and internationally recognized faculty.

MO3: To adapt to the dynamic needs of industries through curriculum update

MO4: Promotes partnerships with industry and community and electrical energy in cement manufacture and environmental needs.

MO5: To produce competent graduates with professional ethics and life skills.

Program Educational Objectives (PEO)

PEO01: To develop technical and managerial skills among the students with practical knowledge to work in cement manufacturing unit and able to handle day to day plant problems.

PEO02: To develop R&D temperament among the students for development, innovation and sustainable technology in cement manufacturing process.

POE03: To develop ethical principles among the students and commitment to fulfilling international, national and local needs and social responsibilities with his/her professional excellence.

PEO04: Ability to understand the impact of professional engineering solutions in societal, economic and environmental contexts and demonstrate knowledge and need for sustainable development

Program Outcomes (POs)

PO1: Computational information: Appreciate and apply mathematical organization, computing and domain information for the conceptualization of computing models from clear harms.

PO2: Difficulty Analysis: Talent to classify, significantly evaluate and prepare complex computing problems using fundamentals of computer knowledge and request domains.

PO3: Drawing / Improvement of Solutions: Facility to transform composite production scenarios and present-day issues into problems, explore, recognize and propose included solutions using rising technologies.

PO4: Accomplish Investigations of Compound Computing Troubles: Ability to invent and ways experiments interpret data and present well up to date conclusions.

PO5: Current Implement Procedure: Skill to select recent computing tools, skills and techniques compulsory for original software solutions

PO6: Proficient Principles: Facility to apply and give expert principles and cyber systems in a universal monetary situation.

PO7: Ultimate Education: Identify the need for and enlarge the ability to appoint in permanent education as a Computing qualified.

PO8: Mission Administration: Skill to recognize administration and computing philosophy with computing acquaintance to supervise projects in multidisciplinary environments.

PO9: Announcement Usefulness: Converse successfully with the computing society as well as culture by being able to know successful documentations and presentations.

PO10: Public & Ecological Alarm: Ability to make out cost-effective, green, public, fitness, authorized, moral issues concerned in the use of processor expertise and other significant tasks applicable to qualified observers.

PO11: Personality & Group Job: Ability to job as a part or manager in various teams in multidisciplinary situations.

PO12: Modernization and Private Enterprise: Classify opportunities, private enterprise dream and use of original thoughts to build worth and means for the betterment of the human being and the world.

Program Specific Outcomes (PSOs)

On completion of B.Sc. IT program, the students will achieve the following program specific outcomes:-

PSO1: An ability to enhance the application of knowledge of theory subjects in diverse fields.

PSO2: Develop language proficiency to handle corporate communication demands.

PSO3: Preparing students in various disciplines of technologies such as computer applications, Computer networking, software engineering, JAVA, database concepts and programming.

PSO4: In order to enhance programming skills of the young IT professionals, the concept of project Development in using the technologies learnt during the semester has been introduced.

Mapping of PEOs with Mission of the Department

PEO	M1	M2	M3	M4
PEO1	3	2	3	2
PEO2	2	2	2	3
PEO3	2	3	2	1
PEO4	2	2	3	3

1*: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) "-": No correlation*

General Course Structure & Scheme

1. Definition of Credit

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
2 Hours Practical (P) per week	1 Credit

2. Range of Credits:

In the light of the fact that a typical Model three-year Under Graduate degree program in computer application has about 120 credits, the total number of credits proposed for the three- year Bachelor of Science in Information Technology is kept as 120 considering NEP-20 and NAAC guidelines.

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General Course Structure and Credit Distribution Scheme

Semester I						
3-Week Orientation Programme						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.	0SDG01	Sustainable Development Goals	2	0	0	2
2.	0EVS03	Environmental Education	2	0	0	2
3.	01IT101	Introduction to information technology and ICT tools	3	1	4	6
4.	02CA121	Programming in C Language	3	1	4	6
	Choose any one (Open Elective)					
5.	03CA171	Desktop Publishing [DTP]	4	0	0	4
	03CA172	Accounting and Tally				
	Total		**14**	**2**	**8**	**20**

Semester II						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.	0SSD02	Communication skills	2	0	0	2
2.	0IKS04	Indian Knowledge System	2	0	0	2
3.	01CA212	Problem solving using Python programming	3	1	4	6
4.	02CA221	Operating System	3	1	4	6
	Choose any one (Open Elective)					
5.	03CA231	Digital marketing	4	0	0	4
	03CA232	Multimedia and Animation				
	Total		**14**	**2**	**8**	**20**

Semester III						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.	O3CA301	Data analytics and visualization through spreadsheet	2	0	0	2
2.	0CA303	Introduction of cloud computing	2	0	0	2
3.	01CA312	Object oriented Programming with C++	3	1	4	6
4.	02CA322	Data Structure	3	1	4	6
	Choose any one (Open Elective)					
5.	03CA333	Internet of things	4	0	0	4
	03CA332	Optimization Techniques				
	Total		**14**	**2**	**8**	**20**

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Semester IV						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.	0EN401	Entrepreneurship Development	2	0	0	2
2.	0CA402	Minor Project	2	0	0	2
3.	02CA421	Internet Applications Using Java Programming	3	1	4	6
4.	01CA411	Database management System using PL/SQL	3	1	4	6
	Choose any one (Open Elective)					
5.	03CA431A	E-Commerce	4	0	0	4
	03CA431B	Computer Maintenance and Troubleshooting				
	Total		**14**	**2**	**8**	**20**

Semester V						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.	0CA505	Web Application Development	4	0	0	4
2.	01CA512	Computer network and information security	4	0	4	6
	Choose any one (DS Elective-1)					
3.	05CA521	Multimedia and animation	4	0	0	4
	05CA522	Design analysis of algorithms				
4.	06CA552	Field Project/Internship/Seminar/Workshop	0	0	12	6
	Total		**12**	**0**	**16**	**20**

Semester VI						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.	01CA612	Linux Operating System	4	0	4	6
	Choose any one (DS Elective-2)					
2.	05CA623-A	Software Engineering	4	0	0	4
	05CA623-B	Mobile Application Development				
	Choose any one (DS Elective-3)					
3.	05CA621-A	AI and Data Science	4	0	0	4
	05CA622-A	Computer Graphics				
4.	06CA652	Field Project/Internship/Seminar/Workshop	0	0	12	6
	Total		**12**	**0**	**16**	**20**

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Semester VII						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.	06RM701	Research Methodology	4	0	0	4
2.	01CA711	Current Trends & Technology	3	1	2	6
	Choose any one (Open Elective)					
3.	05CA722-A	Introduction to Cyber Security	4	0	0	4
	05CA722-B	AI for Everyone				
4.	06CA752	Field Project/Internship/Seminar/Workshop	0	0	6	6
	Total		**11**	**1**	**8**	**20**

Semester VIII						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.	06RM801	English for Research Writing	4	0	0	4
2.	01CA811	Statistical Thinking for Data Science	3	1	2	6
3.	06CA852	Research Project/Thesis Submission	0	0	10	10
	Total		**7**	**1**	**12**	**20**

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Semester - I

Course Code: 0SDG01

Course Title: **Sustainable Development Goals (SDGs)**

Pre-requisite: Student should have basic knowledge of Environment, Natural resources, Climate change and sustainability.

Rationale: To inculcate the knowledge base on sustainable development with a view to balance our economic, environmental and social needs, allowing prosperity for now and future generations. To train students to undertake major initiatives in the efficient management of natural resources and the prevention of environmental pollution with focus on Sustainable Development.
To use environmental management tools that help to improve the quality of environment, to assess local vulnerabilities with respect to climate, natural disasters and to achieve sustainable developmental needs.

Course Outcomes:

0SDG01.1: Examine critically the 17 newly minted UN Sustainable Development Goals and understand the historical evolution, key theories, and concepts of sustainable development.
0SDG01.2: Identify and apply methods for assessing the achievement of sustainable development and discover the science, technology, economics, and politics underlying the concepts of sustainability.
0SDG01.3: Understand the implications of overuse of resources, population growth and economic growth and sustainability and explore the challenges the society faces in making transition to renewable resource use.
0SDG01.4: Develop skills to understand attitudes on individuals, society and their role regarding causes and solutions in the field of sustainable development and apply critical thinking skills to evaluate the quality, credibility and limitations of an argument for solution.
0SDG01.5: Describe the steps of the design thinking methodology and how design thinking can accelerate effective SDG implementation. Deepen knowledge and pedagogical tools to incorporate values-based education for sustainable development in educational Programmes and processes.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Foundation	0SDG01	Sustainable Development Goal	2	0	1	1	4	2

Legend: **CI:** Class room Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+ CAT+AT)		
Foundation	0SDG01	Sustainable Development Goal	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

0SDG01.1: Examine critically the 17 newly minted UN Sustainable Development Goals and Understand the historical evolution, key theories, and concepts of sustainable development.

Approximate Hours

Item	Appx Hrs.
Cl	06
LI	0
SW	1
SL	1
Total	**8**

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO1.1 Understand about Sustainable Development **SO1.2** Understand the Need and Importance of SDGs **SO1.3** Understand the historical evolution of SDGs **SO1.4** Gain knowledge of SDGs Different goals and their importance **SO1.**5 Explain the Challenges & strategies of attaining SDGs in countries.		**Unit-1.0 Introduction to Sustainable Development** 1.1 Need and Importance of Sustainable Development 1.2 Historical & Policy perspectives of Sustainable Development 1.3 Sustainable Development: World and India Perspective 1.4 Introduction to 17 SDGs 1.5 Specific learning objectives for different SDGs 1.6 Challenges & strategies of attaining SDGs in developed and developing nations	Different SDG goals details and its importance

SW-1 Suggested Sessional Work (SW):

a. **Assignments:**
Overview of SDGs, Sustainable Consumption and Production, Details of 17 SDGs

b. **Other Activities (Specify):**
Note down the different challenges in our state and district to achieve SDG.

0SDG01.2: Identify and apply methods for assessing the achievement of sustainable development and discover the science, technology, economics, and politics underlying the concepts of sustainability and measuring.

Approximate Hours

Item	Appx. Hrs.
Cl	06
LI	0
SW	1

SL	1
Total	8

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO2.1 Explain Sustainable Development **SO2.2** Understand the NEP-2020 and SDG **SO2.3** Discuss higher Education role to achieve SDGs **SO2.4** Explain how education for Sustainable Development **SO2.**5 Explain the measuring techniques for Sustainability .		**Unit-2.0** Special focus on SDG 4-Quality Education and Lifelong Learning 2.1 Focus of NEP-2020 on SDG 2.2 Education for Sustainable Development (ESD): 2.3 Berlin Declaration 2021 on ESD 2.4 Integration of ESD in curriculum and textbooks 2.5 Tools, Systems, and Innovation for Sustainability 2.6 Measuring Sustainability: How do we measure sustainability	1 NEP2020 objectives and concept for SDGs 2 Concept ,Tools and techniques for measuring sustainability

SW-1 Suggested Sessional Work (SW):

a. **Assignments:**
Education role to achieve SDGs, the role of education in Sustainable Development, Measuring techniques of sustainability, Sustainability Indicators
b. **Other Activities (Specify):** Seminar and group discussion on ESD and measuring sustainability Millennium Development Goals (MDGs)

0SDG01.3: Understand the implications of overuse of resources, population growth and economic growth and sustainability and explore the challenges the society faces in making transition to renewable resource use.

Approximate Hours

Item	Appx. Hrs.
Cl	06
LI	0
SW	1
SL	1
Total	8

Session Outcomes	Laboratory	Classroom Instruction	Self-

(SOs)	Instruction (LI)	(CI)	Learning (SL)
SO3.1 Understand current economic issues in the context of the global sustainable development debate. **SO3.2** Outline of health, hygiene and water sanitation issues. **SO3.3** Discuss the renewable energy resources and its importance in present scenario **SO3.4** Explain the importance of sustainable production and consumption **SO3.**5 Explain the problems and solution in rural and urban areas.		**Unit-3.0** Understanding the SDGs 3.1 Circular economy (basic model of reuse, recycle, and reduce) 3.2 Rural & urban Problems & Challenges 3.3 Sustainable production and consumption 3.4 Renewable energy 3.5 Health & Hygiene, water , sanitation & water management 3.6 Waste Management	1. Water Treatment and management practices. 2. Non-Renewable energy resources.

SW-1 Suggested Sessional Work (SW):

a. Assignments:
Ecofriendly energy resources importance, types of waste and its management, Urban Problems & Challenges

b. Other Activities (Specify):
Visit of waste water treatment plant, Visit of water treatment process.

0SDG01.4: Develop skills to understand attitudes on individuals, society and their role regarding causes and solutions in the field of sustainable development and apply critical thinking skills to evaluate the quality, credibility and limitations of an argument for solution.

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Approximate Hours

Item	Appx. Hrs.
Cl	06
LI	0
SW	1
SL	1
Total	8

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Understand environmental sustainability is crucial in reducing the impacts of climate change **SO4.2** Discuss causes of emission of GHGs and its consequences **SO4.3** Explain how climate change and sustainable development both play a role in shaping the human and environmental factors of the world. **SO4.4** Explain the importance of sustainable production and consumption **SO4.**5 Climate change is disrupting national economies and affecting lives and livelihoods, especially for the most vulnerable and its mitigation.		**Unit-4.0** Climate Change, Energy and Sustainable Development 4.1 The greenhouse effect: Causes and Consequences 4.2 Climate Change: A Threat to Sustainable Development 4.3 Adaptation to Current and Future Climate Regimes 4.4 The consequences: crop failure 4.5 Solutions technology and lifestyle changes 4.6 Mitigating Climate Change	**1** Agreement on Climate Change, Trade, and Sustainability Carbon Credit, carbon trading 2.Kyoto Protocol

SW-1 Suggested Sessional Work (SW):

a. Assignments:
Urban Sustainability and Climate Change, Sustainable Development Policies, Agreement on Climate Change, Trade and Sustainability, Resilient cities – What makes a city sustainable, green, and resilient?

b. Other Activities (Specify):
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0SDG01.5: Describe the steps of the design thinking methodology and how design thinking can accelerate effective SDG implementation. Deepen knowledge and pedagogical tools to incorporate values-based education for sustainable development in educational programme and processes.

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Approximate Hours

Item	Appx. Hrs.
Cl	06
LI	0
SW	1
SL	1
Total	8

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Understand the relevance and the concept of sustainability and the global initiatives in this direction **SO4.2** Understand role of Corporations and Ecological Sustainability**.** **SO4.3** Explain role of CSR in Sustainability. **SO4.4** Understand the SD challenge for companies, their responsibility and their potentials for action **SO4.5** Discuss the role of world government for world justice and peace		**Unit-5.0** Sustainable Business Practices: 5.1 Corporate Social Responsibility 5.2 Sustainable products and services 5.3 Business and Environment 5.4 Corporations and Ecological Sustainability 5.5 Life Cycle Assessment: • LCA Overview and Application 5.6 World peace and justice: • United nations goals for peace and justice • World Government for peace	Local to the Global: Can Sustainable Development Work

SW-1 Suggested Sessional Work (SW):

a. Assignments:

Consumption Patterns and Lifestyles, Company Perspectives for Environmental Sustainability, an Introduction to Economic Growth

b. Other Activities (Specify):

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (SI)	Total hour (Cl+SW+Sl)
0SDG01.1: Examine critically the 17 newly minted UN Sustainable Development Goals and understand the historical evolution, key theories, and concepts of sustainable development.	6	1	1	8
0SDG01.2: Identify and apply methods for assessing the achievement of sustainable development and discover the science, technology, economics, and politics underlying the concepts of Sustainability.	6	1	1	8
0SDG01.3: Understand the implications of overuse ofresources, population growth and economic growthand sustainability and explore the challenges thesociety faces in making transition to renewable Resource use.	6	1	1	8
0SDG01.4: Develop skills to understand attitudes on individuals, society and their role regarding causes and solutions in the field of sustainable development and apply critical thinking skills to evaluate the quality, credibility and limitations of an Argument for solution.	6	1	1	8
0SDG01.5: Describe the steps of the design thinking methodology and how design thinking can accelerate effective SDG implementation. Deepen knowledge and pedagogical tools to incorporate values-based Education for sustainable development in educational Programmes and processes.	6	1	1	8
Total Hours	**30**	**5**	**5**	**40**

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Need and Importance of Sustainable Development	03	01	01	05
CO-2	Education for Sustainable Development (ESD): Tools, Systems, and Innovation for Sustainability	02	06	02	10

CO-3	Discuss the sustainable production and consumption	03	07	05	15
CO-4	How Climate Change may be Threat to Sustainable Development	-	10	05	15
CO-5	Role of Corporations and Ecological Sustainability	03	02	-	05
Total		11	26	13	50

Legend: R: Remember, U: Understand, A: Apply A: Analyze E: Evaluate C: Create

The end of semester assessment for Sustainable Development Goals will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to industry, water treatment plant
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration /Tutorials CBT, Blog, Facebook, Twitter, Whatsapp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

(a) Books:

S. No.	Title	Author	Publisher	Edition & Year
1	The Economics of Sustainable Development: The Case of India (Natural Resource Management and Policy)"	Surender Kumar and Shunsuke Managi	Springer Switzerland	2009
2	Corporate Social Responsibility in Developing and Emerging Markets	Onyeka Osuji	Cambridge	New Edition June 2022

3	Smart Cities for Sustainable Development	Ram Kumar Mishra, Ch Lakshmi Kumari, Sandeep Chachra, P.S. Janaki Krishna	Springer Switzerland	March 2022
4	Sustainable Development: Linking Economy, Society, Environment	Tracey Strange and Anne Bayley		
5	Management Of Resources For Sustainable Devpt	Sushma Goyal	The Orient Blackswan	2016
6	Energy, Environment and Sustainable Development: Issues and Policies	S. Ramaswamy Sathis G. Kumar	Regal Publications	2009
7	The New Map: Energy, Climate, and the Clash of Nations	Daniel Yergin	Penguin Press	September 2015
8	Contributions of Education for Sustainable Development (ESD) to Quality Education:	Laurie, R., Nonoyama-Tarumi, Y., Mckeown, R., & Hopkins, C.	A Synthesis of Research. Journal of Education for Sustainable Development, 10(2), 226–242.	2016
9	Sustainable Results in Development: Using the SDGs for Shared Results and Impact	OECD	OECD Publishing, Paris	2019
10	Development Discourse and Global History from colonialism to the sustainable development goals	Ziai, Aram	Routledge, London & New York	2016
11	Sustainable Development Goals An Indian Perspective,	Hazra, Somnath., Bhukta, Anindya	Springer Switzerland	2020
12	Environmental Ecology, Biodiversity and Climate Change	HM Saxena	Rawat Publication	January 2021
13	https://www.un.org/sustainabledevelopment/			
14	https://www.aiu.ac.in/documents/AIU_Publications/UN-SDG goals			
15	https://www.unesco.org/en/education-sustainable-development			
16	https://onlinecourses.nptel.ac.in/noc23_hs57/preview			

17	https://www.iau-hesd.net/news/5180-berlin-declaration-education- Development-sustainable adopted-unesco-esd-conference-17-19

Curriculum Development Team

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COs, POs and PSOs Mapping

Program: B.Sc. (IT)

Course Code : 0SDG01
Course Title: Sustainable Development Goals (SDGs)

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help o AI and Data Science Technologies.
CO1. Need and Importance of Sustainable Development	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO2. Education for Sustainable Development (ESD): Tools, Systems, and Innovation for Sustainability	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3
CO3.Discuss the sustainable production and consumption	2	2	1	1	1	2	2	2	1	2	1	2	1	1	2	2	2
CO4. How Climate Change may be Threat to Sustainable Development	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2	2
CO5. Role of Corporations and Ecological Sustainability	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO1. Need and Importance of Sustainable Development	SO1.1 SO1.2 SO1.3 SO1.4		Unit 1: Introduction to Sustainable Development 1.1,1.2,1.3,1.4,1.5,1.6	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO2. Education for Sustainable Development (ESD): Tools, Systems, and Innovation for Sustainability	SO2.1 SO2.2 SO2.3 SO2.4		Unit-2 Special focus on SDG 4-Quality Education and Lifelong Learning: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3.Discuss the sustainable production and consumption	SO3.1 SO3.2 SO3.3 SO3.4		Unit-3.0 Understanding the SDGs 3.1,3.2,3.3,3.4,3.5,3.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO4. How Climate Change may be Threat to Sustainable Development	SO4.1 SO4.2 SO4.3 SO4.4		Unit-4.0 Climate Change, Energy and Sustainable Development 4.1,4.2,4.3,4.4,4.5,4.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO5. Role of Corporations and Ecological Sustainability	SO5.1 SO5.2 SO5.3 SO5.4		Unit-5.0 Sustainable Business Practices 5.1,5.2,5.3,5.4,5.5,5.6	

Semester-I

Course Code: 0EVS03
Course Title: Environmental Science
Pre- requisite: To study this course, the student must have a knowledge about the environmental components, pollution, biodiversity, and Ecosystem at senior secondary, Class 12th level.
Rationale: The students studying Environmental Science should possess foundational understanding about environment and its components. They should also know the importance of ecosystems in our surroundings.

Course Outcomes:

0EVS03.1**:** To understand various aspects of life forms, ecological, processes, and the impacts on them by the human during Anthropocene era.
0EVS03.2**:** To build capabilities to identify relevant environmental issues, analyze the various underlying causes, evaluate the practices and policies, and develop framework to make inform decisions.
0EVS03.3**:** To develop empathy for all life forms, awareness, and responsibility towards environmental protection and nature preservation.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credit (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Foun dation	0EVS03	Environmental Science	2	0	1	1	5	2

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e., Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment: Theory

Boa rd of	Couse Code	Course Title	Scheme of Assessment (Marks)

Study			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA + ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
Foundation	0EVS03	Environmental Science	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

0EVS03**.1:** To understand various aspects of life forms, ecological, processes, and the impacts on them by the human during Anthropocene era.

Approximate Hours

Item	AppX Hrs.
Cl	08
LI	0
SW	1
SL	2
Total	11

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)

SO1.1 Know multidisciplinary nature of environmental science. SO1.2 Learn about the natural resources. SO1.3 Know the problems associated with land resource. SO1.4 Learn the conservation of resources. SO1.5 Know alternative energy resources.	.	**Unit-1 Environment and Natural Resources:** 1.1 The Multidisciplinary nature of environmental studies. 1.2 Scope and Importance of Environmental studies 1.3 Components of Environment: 1.4 Atmosphere, Hydrosphere, 1.5 Lithosphere, and Biosphere. 1.6 Brief account of Natural Resources and 1.7 associated problems 1.8 Land Resource 1.9 Water Resource 1.10 Energy Resource 1.11 Concept of Sustainability and 1.12 Sustainable Development	i. What is environmental Science? ii. What are resources?

SW-1 Suggested Sessional Work (SW):

a. Assignments:

- **i.** Write the definition and causes of soil erosion.
- **ii.** Define desertification and write its causes.
- **iii.** Describe structure of atmosphere.
- **iv.** Explain lithosphere.

0EVS03**.2:** To build capabilities to identify relevant environmental issues, analyze the various underlying causes, evaluate the practices and policies, and develop framework to make inform decisions.

Approximate Hours

Item	AppX Hrs
Cl	05
LI	0
SW	2

SL	2
Total	09

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO2.1 Understand the concept of ecosystem. **SO2.2** Learn the structure of ecosystem. **SO2.3** Know the function of ecosystem. **SO2.4** Describe the structure of forest ecosystem. **SO2.**5 Learn about biodiversity and its conservation.		Unit-2 Biomes, **Ecosystem and Biodiversity** 2.1 Major Biomes: Tropical, Temperate, Forest, Grassland, Desert, 2.2 Tundra, Wetland, 2.3 Estuarine and Marine Ecosystem: Structure 2.4 Function and types their Preservation 2.5 Restoration Biodiversity and its conservation practices.	i. What is biotic and abiotic components of environment? ii. What are interactions?

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. What do you mean by ecosystem? Describe the structure of ecosystem.
ii. Give a brief classification of ecosystem.
iii. Write the function of an ecosystem.
iv. Define biodiversity write strategies of biodiversity conservation.

b. Mini Project:

Visit to various ecosystem and study biotic and abiotic ecosystem.

0EVS03**.3:** To develop empathy for all life forms, awareness, and responsibility towardsenvironmental protection and nature preservation.

Approximate Hours

Item	AppX Hrs
Cl	07
LI	0
SW	02
SL	2
Total	11

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO3.1. Learn about pollution and its sources. **SO3.2** Know the sources of different pollutant. **SO3.3** Understand the law & legislation related to environment. **SO3.4** Learn the control of pollution. **SO3.**5 Describe the role of information technology in environment and human health.		**Unit-3: Environmental Pollution, Management and** Social **Issues:** 3.1 Pollution: Types, Control measures, 3.2 Management and associated problems. 3.3 Environmental Law and Legislation: 3.4 Protection and conservation Acts. International Agreement & **Program** 3.5 Environmental Movements, communication and public awareness Program. 3.6 National and International organizations related to environment conservation and monitoring. 3.7 Role of information technology in environment and human health.	i. What is pollution basic introduction? ii. What is pollutant?

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. Write an essay on air pollution.
ii. What do you mean by acid rain write its causes and effects.
iii. Describe the effects of water pollution.
iv. How soil pollution can be control?
v. Describe the role of information technology in environment and human health.
vi. Mention some national and international organizations related to environment conservation and monitoring.

b. Other Activities (Specify):

Visit to different polluted sites and study the source of pollution and their effects.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
CO.1: To understand various aspects of life forms, ecological processes, and the impacts on them by the human during Anthropocene era.	10	1	2	13
CO.2: To build capabilities to identify relevant environmental issues, analyze the various underlying causes, evaluate the practices and policies, and develop framework to make inform decisions.	10	2	2	14
CO.3: To develop empathy for all life forms, awareness, and responsibility towards environmental protection and nature preservation.	10	2	2	14
Total Hours	30	05	06	41

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	**Environment and Natural Resources:**	03	01	01	05
CO-2	Biomes, **Ecosystem and Biodiversity**	02	06	02	10
CO-3	**Environmental Pollution, Management and** Social **Issues**	03	07	05	15
Total		11	26	13	50

Legend: **R: Remember, U: Understand, A: Apply**

The end of semester assessment for Fundamental of Environmental Science will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture

2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to cement plant
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

(a) Books:

S. No.	Title	Author	Publisher	Edition & Year
1	Ecology; Environment Science and Conservation	Singh; J.S., Singh S.P. and Gupta, S. R	S. Chand publishing, New Delhi.	2018
2	Perspectives in Environmental Studies	Kaushik, Anubha, Kaushik, C.P.	New age International Publishers	2018
3	A Textbook of Environmental Studies	Asthana, D. K Asthana Meera	S. C1iand.Publishing, New Delhi	2007
4	Environmental Law and Policy in India: Cases, Material & Status	Divan, S. and Rosenkranz, A	Oxford University Press, India	2002

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8. Ms. Pinki Sharma, Assistant Professor, Department of Computer Science and Engineering.

COs, POs and PSOs Mapping

Course Name: BCA
Course Code: 0EVS03
Course Title: Environmental Science

Course Outcomes	Program Outcomes												Program Specific Outcomes				
	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
	Engineering knowledge	Problem Analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning					
CO.1: To understand various aspect s of life forms, ecological processes, and The impact s on them by the human during Anthropocene era.	1	3	1	3	3	1	3	3	1	1	1	3	2	2	3	3	
CO.2: To build capabilities to identify relevant environ mental issues, analyze the various underlying causes, evaluate the practices and policies, and develop framework to make, and develop	1	2	2	2	2	1	3	3	1	2	1	3	2	3	2	3	
CO.2: To build capabilities to identify relevant environ mental issues, analyze the various underlying causes, evaluate the practices and policies	1	2	2	2	2	1	3	3	1	2	1	3	2	3	2	3	

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO.1:** To understand various aspects of life forms, ecological processes, and the impacts on them by the human during Anthropocene era.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		Unit-1 1.1,1.2,1.3,1.4,1.5,1.6,	As mentioned in page number above
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO.2:** To build capabilities to identify relevant environmental issues, analyze the various underlying causes, evaluate the practices and policies, and develop framework to make inform decisions.	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5		Unit-2 1.1,1.2,1.3,1.4,1.5,1.6,1.7	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO.3:** To develop empathy for all life forms, awareness, and responsibility towards environmental protection and nature preservation.	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5		Unit-3 1.1,1.2,1.3,1.4,1.5,1.6,1.7	

Semester-I

Course Code: 011T101

Course Title: Introduction to Information Technology and ICT Tools

Pre-requisite: Open for All

Rationale: The rationale for introducing individuals to Information Technology and ICT tools lies in their fundamental importance for navigating the digital world, enhancing communication and productivity, accessing information, fostering digital literacy, unlocking career opportunities, fostering innovation, enabling global connectivity, and promoting adaptability and lifelong learning.

Course Outcomes:

011T101.1**:** Students will learn about various formats to represent different types of data.
011T101.**2:** Students learn about basic computer organization and its peripherals.
011T101.3: Students make use of word processor, spreadsheet and slide presentation software or effective Information us age.
011T101.4**:** Students will learn about various cutting-edge technologies used in managing Information.
011T101.5: Students will learn about various network technologies

Scheme of Studies:

Course Category	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours(CI+LI+SW +SL)	
Major	011T101	Introduction to Information technology and ICT Tools	4	4	1	1	10	6

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Course Category	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA + ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
Major	011T101	Introduction to Information technology and ICT Tools	15	20	5	5	5	50	50	100

Practical

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)						
			Progressive Assessment (PRA)					End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Viva1 (5)	Viva2 (5) (SA)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
Major	011T101	Introduction to Information technology and ICT Tools	35	5	5	5	50	50	100

Course-Curriculum Detailing:

This course curriculum illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course

Progresses, students should show case their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) up on the course's conclusion.

011T101-**1:** Students will learn about various formats to represent different types of data.

Approximate Hours

Item	AppX Hrs
Cl	12
LI	12
SW	01
SL	01
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO1.1 Understand the Data, Information, Information Technology (IT)and Information Communication Technology (ICT) **SO1.2** Explain the Internal representation of numeric data Binary, Hexadecimal, conversion from Decimal to Binary and Hexadecimal and vice-versa, **SO1.3** Explain the **t**ypes of data, simple model of a computer, data processing using a computer **SO1.4** Discuss representation of characters in computers: ASCII, EBCDIC, Unicode. **SO1.**5 Explain Acquisition of Text, Image, Audio and Video, data, storage formats for Text, Images, Audio and Video data, Compression standards for Audio and Video, MPEG standard	**LI1.1.** Open the computer cabinet of a desktop computer and find out the placement and details of various functional units of computer **LI1.2.** Explore CPU, Primary memory, cache memory, secondary memory, motherboa rd, external ports etc. **LI1.3.** Give example of conversion from binary to decimal and vice versa **LI1.4.** Give example of conversion from binary to octal and vice versa	**Unit-1 Introduction to information technology and ICT Tools** 1.1 Definition of: Data, Information, Information Technology (IT) and Information Communication Technology (ICT). 1.2 Types of data, simple model of a computer, data processing using a computer. 1.3 Internal representation of numeric data: Binary, Hexadecimal, 1.4 Conversion from Decimal to Binary and 1.5 Hexadecimal and vice-versa 1.6 Representation of characters in computers: ASCII, EBCDIC, 1.7 Unicode, Acquisition ofText 1.8 Image, Audio and Video, data, storage formats for Text, Images, 1.9 Audio and Video data, Compression standards for Audio and Video, MPEG standard 1.10 Learn to install Windows and Linux on computer. 1.11 Learn to createfolder and file. 1.12 Learn Different elementsof window OS.	

	LI1.5. Give example of conversion from binary to hexadecimal and vice versa		

SW-1 Suggested Sessional Work (SW):

a. Assignments:

b. Major - Paper I:

c. Other Activities (Specify): Seminar

011T101-**2: S**tudents learn about basic computer organization and its peripherals.

Approximate Hours

Item	AppX Hrs
Cl	12
LI	12
SW	01
SL	01
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO2.1 To Understand types and Classification of computers **SO2.2**To understand block diagram of computer. **SO2.3** Explain the hierarchy of memory. **SO2.4** Explain the mother board and its Different ports and processor and clock. **SO2.5** Explain the peripheral devices.	LI2.1. Acquaintance with Laser printer, ink jet printers and dot matrix printers. LI2.2. Learn how to connect printer with computer LI2.3. Learn how to connect scanner with computer LI2.4. How bar code reader works. LI2.5. How camera and LI2.6. Microphone connects with	**Unit-2 Computer Hardware** **2.1** Types and Classification of computers **2.2** Block diagram of computer **2.3** Registers, system bus, main memory unit, RAM, ROM cache memory **2.4** Primary, secondary, auxiliary memory, hard disks, pen drive, optical disks **2.5** SMPS, Mother board, Port sand Interfaces, expansion cards, ribbon cables, memory chips, different processors and clock speed. **2.6** Input devices - Keyboard, Mouse, **2.7** Joy Stick, Digitizing Tablet, **2.8** Touchscreen, Light Pen, **2.9** Track Ball, Microphone, MICR, OCR, OMR, Barcode Reader, Webcam, Digital Camera, Touch Pad,	

	computer	Smart card reader, **2.10** Scanner. **2.11** Output devices- Printers: Dot Matrix, Laser and Inkjet printers, **2.12** Plotters, Device Drivers.	

SW-2 Suggested Sessional Work (SW):

011T101-**3:** Students make use of word processor, spreadsheet and slide presentation software or effective information us age.

Approximate Hours

Item	AppXHrs
Cl	12
LI	12
SW	01
SL	01
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self Learning (SL)**
SO3.1 To Understand the Software, Relationship between Hardware and software. **SO3.2** Explain the types of Software. **SO3.3** To learn types of system Software. **SO3.4** Explain Social Media Software	**LI3.1. Practicing** Ms word/ LI3.2. Practicing LibreOffi Writer LI3.3. Practising menus/Ribbons and toolbar options LI3.4. Preparing document. LI3.5. Practicing MS Excel/Libre Office Cal LI3.6. Practicing menus/Ribbons And toolbar Options for preparing Spreadsheets. Learn how touse the Toolbar And different Menus.	**Unit-3: Software** **3.1** What is Software? Relationship between Hardware and software. **3.2** Types of Software: system software. **3.3** Application Software, Firmware Role of System Software. **3.4** Types of system Software: Operating Systems, Language Translator, Utility Programs **3.5** Communication software, commonly used Application Software. **3.6** Database, Graphics, **3.7** Education, Entertainment Software, **3.8** Mobile App Software. **3.9** Social Media Software: Instant Messaging, **3.10** Email, **3.11** Chat Boat, **3.12** Weblogs.	

	How to create And save the Document.		

SW-3 Suggested Sessional Work (SW):

Assignments:

Major - Paper I:

Other Activities (Specify):

011T101-**4:** Students will learn about various cutting-edge technologies used in managing Information.

Approximate Hours

Item	AppXHrs
Cl	12
LI	12
SW	01
SL	01
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO4.1 To Understand the Word Processing. **SO4.2 To** learn creating, saving and open a document and formatting text, document and alignment. **SO4.3 To learn** Spreadsheet basics. **SO4.4** To learn Slide Presentation.	LI4.1. Practicing MS PowerPoint/ Libre Office Impress LI4.2. Working with menus/Ribbons and toolbar options for LI4.3. Preparing slide presentations. LI4.4. Create your e-mail account on anyfree-mail website and be familiarwith Various	**Unit-4 MS Office** **4.1** Word Processing: Introduction to Word Processing. **4.2** MS Word/ Libre Office Writer: features, **4.3** creating, saving and Operating Multi documentwindows. **4.4** Editing Text: selecting, deleting movingtext. Formatting **4.5** Documents: Paragraph formats, Aligning Text and Paragraph, **4.6** Borders and Shading, Headers and footers. **4.7** Spreadsheet basics, MS Excel/LibreOffice Calc create, enter data and save worksheet.	

	options. LI4.5. How to create worksheet and use different menus in Excel. LI4.6. How to create presentation in MS power point.	**4.8** Uses of all options of toolbars and menus, keyboard shortcuts, working with formulas andcell referencing, auto sum. **4.9** MS Power Point/ Libre Office **4.10** ImpressIntroduction, Slide Show, Formatting, creatinga Presentation. **4.12** Use of all options of Menus/Ribbons andtoolbars.	

SW-4 Suggested Sessional Work (SW):

Assignments:

Major - Paper I:

Other Activities (Specify):

011T101-**5:** Students will learn about various network technologies.

Approximate Hours

Item	AppXHrs
Cl	12
LI	12
SW	01
SL	01
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO5.1 To Understand the Computer Networks. **SO5.2** To learn about the cloud based services. **SO5.3** Explain the E-commerce system architecture, Types: BTOC, BTOB, CTOC, IPR and Ecommerce **SO5.4** Explain the Open Source Terminologies. **SO5.5** Explain the Proprietary Software, FOSS and FLOSS, GNU, FSF, OSI., IT Act	LI5.1. Create your blog account on any free website and be familiar with various options. LI5.2. Learn the use ofGoogle cloud work space platform to store, share and disseminate Information. LI5.3. Learn how to create E-mail in Gmail. LI5.4. How to use different social media platform LI5.5. How to use	**Unit5 Computer Network** 5.1 Computer Networks: LAN and WAN and 5.2 Internet, Bluetooth, 5.3 Client Server architecture. 5.4 Cloud based services: 5.5 Google Workspace. 5.6 DOCS, Sheets, Slides, Forms, Calendar 5.7 , Chat, Meet, Contacts, Maps, Jamboard. 5.8 You Tube, E-commerce system Architecture. 5.9 Types: BTOC, BTOB, CTOC, IPR and Ecommerce Open Source Terminologies: Open 5.10Source Software, Freeware, and 5.11Shareware.	

	YouTube. LI5.6. How to use ecommerce site	a. Proprietary Software, FOSS and 5.12FLOSS, GNU, FSF, OSI., IT Act.	

SW-4 Suggested Sessional Work (SW):
Assignments:
Major - Paper I:

Other Activities (Specify):

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instruction (LI)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
011T101.1**:** **S**tudents will learn about various formats to represent different types of data.	12	12	01	01	26
011T101.2**:** **S**tudents learn about basic computer organization and its peripherals.	12	12	01	01	26
011T101.3**:** students make use of word processor, spreadsheet and slide presentation software or effective information us age.	12	12	01	01	26
011T101.4**:** Students will learn about various cutting-edge technologies used in managing Information.	12	12	01	01	26
011T101.5**:** **S**tudents will learn about various network technologies	12	12	01	01	26
Total Hours	60	60	05	05	130

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	

CO-1	Data and Information Technology	03	02	03	08
CO-2	Computers, Data Storage and Peripherals	03	01	05	09
CO-3	Computer Software	03	07	02	12
CO-4	Processing and Displaying Textual Data	03	05	05	13
CO-5	Overview of Technologies	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

The end-of-semester assessment for Introduction to Introduction to Information Technology and ICT Tools will be held with written examination of 50 marks.

Note. Detailed Assessment rubric need to be prepared by the course wise Teachers for above tasks. Teachers can also design different tasks as per requirement, for end Semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to Software Company
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

A. Books:

S. No.	Title	Author	Publisher	Edition &Year
1	Computer Science Fundamentals	Gaurav Sharma and Mansoor Alam	Pragya Publication Pvt. Ltd.	1st 30 December 2020

Curriculum Development Team

Dr. Mirza Samiullah Beg Assistant Professor, Department of Computer Science and Engineering..

CO, PO and PSO Mapping

Course Title: B.Sc. (IT)

Course Code: 011T101

Course Title: Introduction to information technology and ICT Tools

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
	Engineering knowledge	Problem analysis	Design/development of	Conduct studies of	Utilization of modern	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking int account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help o AI and Data Science Technologies.
CO1. **S**tudents will learn about various formats to represent different types of data.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO2. **S**tudents learn about basic computer organization and its peripherals.	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3
CO3. Students make use of word processor, spreadsheet and slide presentation software or effective information us age.	2	2	1	1	1	2	2	2	1	2	1	2	1	1	2	2	2
CO4. Students will learn about various cutting- edge technologies used in managing Information	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2	2
CO5. **S**tudents will learn about various network technologies	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3	3

Course Curriculum Map

POs&PSOs /*-No.	COsNo.&Titles	SOsNo.	LaboratoryInstruction(LI)	Classroom Instruction(CI)	SelfLearning(SL)
PO: 1,2,3,4,5,6,7,8,9,10,11,12 PSO:1,2,3,4	**CO- 1:** Students will learn about various formats to represent different types of data.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	LI1:1.1 LI2:1.2 LI3:1.3 LI4:1.4	Unit-1.0 Introduction to information technology and ICT Tools 1.1,1.2,1.3,1.4,1.5,1.6,1.7	As Mentioned in Page no._____to _____
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO: 1,2,3,4	**CO- 2:** Students learn about basic computer organization and its peripherals.	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5	LI1:2.1 LI2:2.2 LI3:2.3 LI4:2.4	Unit-2 Computer Hardware 2.1,2.2,2.3,2.4,2.5,2.6,2.7,2.8	
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO: 1,2,3,4	**CO- 3:** Students make use of word processor, spreadsheet and slide presentation software or effective information us age.	SO3.1 SO3.2 SO3.3 SO3.4	LI1:3.1 LI2:3.2 LI3:3.3 LI4:3.4	Unit-3: Software 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8	
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO: 1,2,3,4	**CO- 4:** Students will learn about various cutting-edge technologies used in managing Information.	SO4.1 SO4.2 SO4.3 SO4.4	LI1:4.1 LI2:4.2 LI3:4.3 LI4:4.4	Unit-4: MS Office 4.1,4.2,4.3,4.4,4.5,4.6,4.7	
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO: 1,2,3,4	**CO- 5:** Students will learn about various network technologies	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5	LI1:5.1 LI2:5.2 LI3:5.3 LI4:5.4	Unit5: Computer Network 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8	

A K S University

Faculty of Computer Application & Information Technology and Science **Department of Computer Application& Information Technology Curriculum of BSC (IT)**
(Bachelor of Science)
(Revised as on 01 August 2023)

Semester - I

Course Code: 02CA121

Course Title: Programming in C Language

Pre-requisite: Student should have a basic understanding of Fundamental of Computer.

Rationale: Importance of C programming and its practical applications C programming language holds immense importance in the software development industry. Its simplicity, efficiency, and versatility make it a powerful tool for developing a wide range of applications. From operating systems to embedded systems, C finds its use in numerous domains.

Course Outcome:

02CA121.**1:** At the end of this chapter the student will explain the core concept of C programming Algorithms and Flowcharts.
02CA121**1.2:** At the end of this chapter the student will use various input output operations and control statements.
02CA121.**3:** At the end of this chapter the student will use Array and Function in programs.

02CA121.**4:** At the end of this chapter the student will describe the pointers and use of structure and union
02CA121.**5:** At the end of this chapter the student will use File handling Programs.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits(C)
			Cl	LI	SW	SL	Total Study Hours(CI+LI+SW +SL)	
Program Core(TBSC IT)	02CA121	**PROGRAMMING IN C LANGUAGE**	4	4	1	1	10	6

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, fielder other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW&SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment(Marks)							
			Progressive Assessment(PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ESA)
			Class/HomeAssignment5number 3 marks each (CA)	Class Test2 (2bestout of3) 10 marks each(CT)	Seminar one (SA)	Class Activity anyone (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
Major	02CA121	Programming ng in C Language	15	20	5	5	5	50	50	100

Practical

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)						
			Progressive Assessment (PRA)					End Semester Assessment (ESA)	Total Marks (PRA+ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Viva1 (5)	Viva2 (5) (SA)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
Major	02CA121	Programming ng in C Language	35	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

02CA121.1: At the end of this chapter the student will explain the core concept of C programming Algorithms and Flowcharts.

Approximate Hours

Item	Appx Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	26

SW-1 Suggested Sessional Work (SW):

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO1.1 Understand about language and programming paradigm. **SO1.2** Understand Over view of procedural Programming and object-oriented Programming **SO1.3** Understand Algorithms Flow Charts - Symbols, Rules for making. **SO1.4** Understand Flow chart, Types of flowcharts	LI1.1. Write an algorithm to print the sum and product of digits of An integer. LI 1.2 Draw a flowchart to find greatest between 2 Numbers. LI1.3 Write an algorithm to check the inputted year is Leap year or not. LI1.4 Draw flow chart of an educational institute. LI1.5.Draw flowchart for a bank. LI1.6.Write an algorithm to print a table of given number.	**Unit-1.0** Introduction: 1.1 Programming Paradigm. 1.2 Difference between OOP and POP 1.3 Overview of object-oriented Programming. 1.4 Understanding Algorithms 1.5 C program structure 1.6 Flowcharts and its Symbols 1.7 Programming logics	1. Use of algorithms for develop program.

SO1.5 Understand about techniques of problem solving: Programming Techniques — Top down, bottom up, Modular		1.8 use of Structured - Features, 1.9 Merits & 1.10 Demerits 1.11 Testing & debugging & 1.12 their Tools	

02CA121.2: At the end of this chapter the student will use various input output operations and control statements.

Approximate Hours

Item	Appx Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO2.1 Understand about language and programming paradigm. **SO2.2** Understand about use of Character set **SO2.3** Use of Identifier and keyword **SO2.4** Understand about Data Types	LI2.1. Write a program to print the sum and product of digits of an integer. LI 2.2 Write a program to reverse digit of a number. LI2.3 Write a program to compute the sum of the first n natural numbers. LI2.4. Write a program to compute the sum of the first n terms of the following series S = 1+1/2+1/3+1/4+……	**Unit-1.0 Introduction**: 2.1 Programming Paradigm. 2.2 C-Character Set. 2.3 Identifier and 2.4 Keyword 2.5 Data Types 2.6 Constant 2.7 Variable 2.8 Operators-1 2.9 Operators-2 2.10 Decision Control Statement 2.11 Looping control Statement	1. Use of algorithms for develop program. 2. Create program in C use of decision and looping statement.

SO2.5 Understand about constant and variable.	LI2.5 Write program of operators. LI2.6. Write program of Decision control statement.	2.12 Jumping statements	

SW-2 Suggested Sessional Work (SW):

a) Assignments:
- Create a program in C to check the input no is prime or not.
- Create a program in C to print a factorial of given no.

b) Mini Project:
- C Program to Make a Simple Calculator Using switch...case.

c) Other Activities (Specify):
- Printing patterns using C programs

02CA121.3: At the end of this chapter the student will use Array and Function in programs.

Approximate Hours

Item	Appx Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO3.1 Understand Array. **SO3.2** Types of arrays. **SO3.3** Use of function **SO3.4** Understand about call by value and call by reference **SO3.5** Understand about storage classes. **SO3.6** use of String functions	LI 3.1 Write a function that checks whether a given string is Palindrome or not. LI3.2. Use this function to find whether the string entered by user is Palindrome or not.	**Unit-3.0 Array**: 3.1 Defining, Declaring Array 3.2 Initializing Array. 3.3 Types of Arrays. 3.4 C-Function-1 3.5 C-Functions-2 3.6 Declaration and definition of function 3.7 Call by value 3.8 call by reference	1. Use of array for develop program. 2. Create program in C use of function.

	LI 3.3 Write a program that prints a table LI3.4. Write a program indicating the number of occurrences of each alphabet in the text entered as command line arguments. LI 3.5 Program for factors of a given number. LI3.6. Write program for fabonacci of a numbr.	3.9 Storage Classes-1 3.10Storage classes-2 3.11String functions-1 3.12String functions-2	

SW-2 Suggested Sessional Work (SW):

a) Assignments:
- Create a program in C to create two-dimensional array.

b) Mini Project:
- C Program to add two matrices.

c) Other Activities (Specify):
- Printing patterns using C programs

02CA121.4: At the end of this chapter the student will describe the pointers and use of structure and Union.

Approximate Hours

Item	Appx Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	16

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Understand about pointer.	LI 4.1 Write a program that	**Unit-4.0 Pointer** 4.1 Introduction	1. Use of Pointer

SO4.2 Declaration of pointer **SO4.3** Use of pointer with array **SO4.4** Use pointer with function **SO4.5** Understand about pointer and structure. **SO4.**6 preprocessor, #define defining functions **SO4.7** Use of structure And union, pointer within structure.	Swaps two numbers using pointers. LI 4.2 Write a program in which a function is passed address of two variables and then alter its Contents. LI 4.3 Write a program to calculate area of circle using preprocessor Directives LI4.4. Write a program to show pointer to structure. LI4.5. Write a program to show pointer within structure. LI4.6. Write a program to show use of Pointer	4.2 Features 4.3 Declaring Pointer 4.4 Examples of Pointer 4.5 Pointer to Array 4.6 Pointers to Function 4.7 Example 4.8 Pointer to Structure 4.9 Pointer within Structure 4.10 Example based on pointer. 4.11 Preprocessor 4.12 Defining functions	2. use of structure and union 3. use of preprocessor, #define defining functions

SW-1 Suggested Sessional Work (SW):

a) Assignments:
- Create a program in C to check the input no is prime or not.
- Write difference between structure and union.

b) Mini Project:
- Create a C program to store and print 5 employee record using structure.

c) Other Activities (Specify):

02CA121.5: At the end of this chapter the student will use File handling Programs

Approximate Hours

Item	Appx Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO5.1 Understand about file handling. **SO5.2** File handling function **SO5.3** Random access file **SO5.4** Learn graphics programming **SO5.5** Use of command line Argument.	LI5.1WAP to display Fibonacci series Using recursion, LI5.2. WAP to display Fibonacci series Using iteration LI 5.3. WAP for call by value and call by reference. LI 5.4. Explain fprintf() and fscanf() with Example. LI5.5. WAP to show use of getc() and putc(). LI5.6. WAP to show use of Command line arguments	**Unit-5.0 File Management** 5.1 Introduction, Text vs Binary File. 5.2 Declaring File Pointer 5.3 File Handling: fopen (), fclose (), 5.4 getc (), putc (), 5.5 gets (), puts (), 5.6 fprintf: fopen (), fclose (), 5.7 getc (), putc (), 5.8 gets (), puts (), 5.9 fprintf (), fscanf () 5.10 Random Access 5.11 File, fseek (), ftell (), rewind (). 5.12 Command Line Arguments	1. Use of file handling. 2. Command Line Arguments

SW-1 Suggested Sessional Work (SW):

a) Assignments:

- Create a program in C to store and read a file content in C.
- Create a program in C to draw and fill rectangle.

b) Mini Project:

- Write a program in C draw polygon.

c) Other Activities (Specify):

- Printing patterns using C programs

Course Out Comes	Class Lecture (Cl)	Laboratory Instruction(LI)	Sessiona l Work (SW)	Self-Learnin g (Sl)	Total hour(Cl+ SW+Sl)
02CA121.1: At the end of this chapter the student will explain the core concept of C programming Algorithms and Flowcharts.	12	12	1	1	12

02CA121.2: At the end of this chapter the student will use various input output operations and control statements.	12	12	1	2	13
02CA121.3: At the end of this chapter the student will use Array and Function in programs.	12	12	1	2	11
02CA121.4: At the end of this chapter the student will describe the pointers and use of structure and union	12	12	1	3	11
02CA121.5: At the end of this chapter the student will use File handling Programs	12	12	1	2	13
Total Hours	**60**	**60**	**5**	**10**	**60**

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO1	At the end of this chapter the student will explain the core concept of C programming Algorithms and Flowcharts.	03	04	03	10
CO2	At the end of this chapter the student will use various input output operations and control statements.	05	03	02	10
CO3	At the end of this chapter the student will use Array and Function in programs.	05	02	03	10
CO4	At the end of this chapter the student will describe the pointers and use of structure and union	04	04	02	10
CO5	At the end of this chapter the student will use File handling Programs	03	05	2	10
Total		20	15	15	50

Legend: R: Remember, U: Understand, A: Apply

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/ Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to IT Industry.
7. Demonstration
8. ICT Based Teaching Learning(Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

S. No.	Title	Author	Publisher	Edition &Year
1	The C Programming Language	Kernighan, Ritchie	Prentice Hall of India.	Revised edition21edition 2020
2	Programming Language Concepts	Carlo Ghazi, Mehdi Jazayeri	John Wiley and Sons	1999
3	Programming in ANSI C	E. Balagurusamy	Tata McGraw Hill	2002
4	Let Us C	Yashavant Kanetkar	Seventh Edition, BPB Publications	2007
5	Programming in C	Reema Thareja	Oxford University Press India, Noida	

Curriculum Development Team

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COs, POs and PSOs Mapping

Course Title: BSc.(IT)
Course Code: 02CA121
Course Title: **PROGRAMMING IN C**

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO1 At the end of this chapter the student will explain the core concept of C programming Algorithms and Flowcharts.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO2 At the end of this chapter the student will use various input output operations and control statements.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO3 At the end of this chapter the student will use Array and Function in programs.	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3
CO4: At the end of this chapter the student will describe the pointers and use of structure and union	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2	2
CO.5: At the end of this chapter the student will use File handling Programs.	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3	3
Legend: 1 – Low, 2 – Medium, 3 – High																	

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5,6,7	CO1: At the end of this chapter the student will explain the core concept of C programming Algorithms and Flowcharts.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	LI1.1 LI1.2 LI1.3	UNIT – I: Introduction OOPS: 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9,1.10	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO2: At the end of this chapter the student will use various input output operations and control statements.	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5	LI2.1 LI2.2 LI2.3	UNIT – II: Introduction of Programming Paradigm 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9,2.10	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3: At the end of this chapter the student will use Array and Function in programs.	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5	LI3.1 LI3.2 LI3.3	UNIT – III: Array 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO4: At the end of this chapter the student will describe the pointers and use of structure and union	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5	LI4.1 LI4.2 LI4.3	Unit-4: Pointer 4.1,4.2,4.3,4.4,4.5,4.6,4.7	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO.5: At the end of this chapter the student will use File handling Programs.	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5	LI5.1 LI5.2 LI5.3	Unit-5: File Management 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10	

A K S University

Faculty of Engineering and Technology

Department of Computer Application& Information Technology

Curriculum of B.Sc. IT

Semester - I

Course Code: 03CA171
Course Title : **Desktop Publishing [** DTP]
Pre-requisite: MS word, Excel, MS Paint

Rationale: This course introduces students to the principles of design applicable to publications created using desktop publishing software and computer technology. Special attention is given to design principles, typography, and layout and production techniques. This class focuses on gaining professional-level skills and knowledge. In this course, the students will discover how to use the essential building blocks of design type, art and line in new and creative ways, learn clever ways to locate and use resources such as graphics and scanned art, learn to think about audience and medium and how those affect the way you craft your message and also be learning to use new technical tools to create those effective messages.

Course Outcomes:

03CA171.1: Understand basics of computer and its related terminology.

03CA171.2: Write, Edit & Print documents using PageMaker.

03CA171.3: Understand various Photoshop tools used for Desktop Publishing and would be able to edit an image.

03CA171.4: Apply different CorelDraw tools and options to create a poster, Monogram, Visiting card etc.

03CA171.5: Understand Color concept in Printing.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credit (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Open Elective	0CA302	**DTP**	4	0	1	1	6	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),

LI: Laboratory Instruction (Includes Practical performance laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA + ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
OE	0CA302	DTP	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

CO101.1: **Understand basics of computer and its related terminology.**

Approximate Hours

Item	Appx. Hrs.
Cl	11
LI	0
SW	2
SL	1
Total	14

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO1.1 Understand the concept of Computer fundamentals. **SO1.2 Compare** types of Software. **SO1.4 Use** MS Word & Excel for documentation. .		**Unit-1. COMPUTER FUNDAMENTALS: (09Lectures)** 1.1. Computer and Its Advantages & 1.2. Disadvantages, 1.3. Generations of computer. 1.4. Block Diagram of a Computer, 1.5. Description of Different parts of a computer, 1.6. System Software 1.7. and Application Software, 1.8. Introduction to MS Office, 1.9. Word Processing Software. 1.10. Electronic Spreadsheet, 1.11. MS Paint	1. Search devices use in computer 2. Excel formulas

SW-1 Suggested Sessional Work (SW):

a. Assignments:

(i) Explain Software and its type.

b. Presentation

c. Pictorial representation of Block Diagram of Computer.

CO101.2: **Write, Edit & Print documents using PageMaker.**

Approximate Hours

Item	Appx. Hrs.
Cl	10
LI	0
SW	2
SL	1
Total	13

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO2.1 Understand the concept of PageMaker. **SO2.2 Use** the various tools of PageMaker.	.	Unit-2 **PageMaker** **(05 Lectures)** 2.1 PageMaker Introduction 2.2 & itsvarious versions. 2.3 Concepts and 2.4 applications of PageMaker. 2.5 Guides & rulers. 2.6 Drawing tools-1 2.7 Drawing tools-2 2.8 Drawing tools-3 2.9 Fills & 2.10 outlines.	1. Learn all menu of PageMaker.

SW-2 Suggested Seasonal Work (SW):

a. Assignments:

(i) Explain fill and outlines

b. Presentation

c. Pictorial representation of PageMaker Drawing tools:

CO101.3: Understand various Photoshop tools used for Desktop Publishing and Would be able to edit an image.

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO3.1 Understand the concept of Photoshop and its tools **SO3.2 Use** various tools of Photoshop to edit an image.	.	**Unit-3: Photoshop:** **(07 Lectures)** 3.1 History & 3.2 introduction of Photoshop, 3.3 The File Menu, 3.4 The tools,-1 3.5 The tools-2 3.6 Drawing lines & 3.7 Shapes. 3.8 Photo editing/ 3.9 inserting starting withsetting up, 3.10 Introduction of layers, 3.11 Understanding Design principles and 3.12 color theory,	i. Edit an image using various tools and options.

SW-3 Suggested Seasonal Work (SW):

a. Assignments:

(i) Explain submenus of File menu.

b. Presentation

c. Pictorial representation of Photoshop Toolbox:

CO101.4: Apply different CorelDraw tools and options to create a poster, Monogram, Visiting card etc.

Approximate Hours

Item	Appx. Hrs.
Cl	20
LI	0
SW	2
SL	1
Total	23

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO4.1 Understand the concept of Corel Draw **SO4.2 Use** of various tools in CorelDraw **SO4.3 Utilizes** CorelDraw tools and options to create a logo/visiting cards/poster etc.	.	**Unit-4 : Corel Draw:** **(06 Lectures)** 4.1. Corel Draw introduction 4.2. Drawing lines Shapes. 4.3. Inserting-pictures, 4.4. objects, 4.5. tables, 4.6. templates 4.7. Use of various tools such as Pick tools, 4.8. Zoom tools, 4.9. Free handtool, 4.10. square tool 4.11. Use of various tools such as rectangle tool, 4.12. text tool, 4.13. fill tooletc. 4.14. all fonts used in designing of monograms, 4.15. logos, 4.16. posters, 4.17. stickers, 4.18. greeting cards, 4.19. wedding cards, 4.20. visiting cards, etc.	i. Create a logo/visiting card/poster

SW-4 Suggested Sessional Work (SW):

Assignments: a.

(i) How can we insert image, table and templates?

b. Presentation

c. Pictorial representation of CorelDraw Tools

CO101.5: Understand Color concept in Printing.

Item	Appx. Hrs
Cl	03
LI	0
SW	2
SL	1
Total	06

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO5.1 **Understand** the concept of Color Harmony SO5.2 **Demonstrate** the use of Color		**Unit5: Introduction to colors:** **(03 Lecture)** 5.1. Design Principles & 5.2. Color Harmony 5.3. Introduction to Colors-Primary and Secondary in RGB 5.4. schemes/modes. 5.5. Introduction to Colors-Primary and 5.6. Secondary in CMYK 5.7. schemes/modes.	1.Learn color wheel

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Explain Design Principles

b. Presentation:

c. Other Activities (Specify): Group discussion on important topics.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
CO1: Understand basics of computer & its related terminology.	11	02	01	14
CO2: Write, Edit & Print documents using PageMaker.	10	02	01	13
CO3: Use various Photoshop tools and Edit an image.	12	02	01	15
CO4: Create a Poster, Monogram, Visiting card etc.	20	02	01	23
CO5: Understand Color concept in Printing.	7	02	01	10
Total Hours	60	10	05	75

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Unit-1	03	02	03	08
CO-2	Unit-2	03	01	05	09
CO-3	Unit-3	03	07	02	12
CO-4	Unit-4	03	05	05	13
CO-5	Unit-5	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for autonomous system for AI and DS will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT,Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
8. Brainstorming

Suggested Learning Resources:

Books:

S. No.	Title	Author	Publisher	Edition & Year
1	Desk Top Publishing from A to Z	Bill Grout and Osborne	McGraw Hill	
2	DTP (Desk Top Publishing) for PC user	Houghton	Galgotia Publishing House Pvt. Ltd., Daryaganj, New Delhi.	
3	Corel draw the Official Guide	Gray David Bouton	Corel Press	

A. Alternative NPTEL/SWAYAM/MOOC Course (if any): NA

Curriculum Development Team

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COs, POs and PSOs Mapping

Course Title: BSc IT
Course Code: 0CA302
Course Title: DTP

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineeringto comprehend, evaluate, and create computer Programmesin the field of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardwareand software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions forsocietal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the mostrecent Artificial Intelligence and Data Science technologies in the fields of engineeringand computer science	Recognize and examine issues in real life, then offer creative software solutions with the help o AI and Data Science Technologies.
CO1 The student will Understand basics of computer and its related terminology.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO2 The student will Write, Edit & Print documents using PageMaker.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO3 The student will Understand various Photoshop tools used for Desktop Publishing andwould be able to edit an image.	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3
CO4: The student will Apply different CorelDraw tools and options to create a poster, Monogram, Visitingcard etc.	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2	2
CO.5: The student will Understand Color concept in Printing.	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4,5	CO1 The student will Understand basics of computer and its related terminology.	SO1.1 SO1.2 SO1.3		UNIT – I: Computer Fundamentals 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9	As mentioned inpage number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO2 The student will Write, Edit & Print documents using PageMaker.	SO2.1 SO2.2		UNIT – II: PageMaker 2.1, 2.2, 2.3, 2.4, 2.5	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3 The student will Understand various Photoshop tools used for Desktop Publishingand would be able to edit an image.	SO3.1 SO3.2		UNIT – III: Photoshop 3.1,3.2,3.3,3.4,3.5,3.6,3.7	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO4: The student will Apply different CorelDraw tools and options to create aposter, Monogram, Visiting card etc.	SO4.1 SO4.2 SO4.3		Unit-4: CorelDraw 4.1,4.2,4.3,4.4,4.5,4.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO.5: The student will Understand Color concept in Printing.	SO5.1 SO5.2		Unit-5: Introduction to colors 5.1,5.2,5.3	

Semester - I

Course Code: **03CA172**

Course Title: **Accounting and Tally**

Pre-requisite: Student should have basic knowledge of transaction in business

Rationale: This syllabus is designed to provide students with a comprehensive understanding of accounting principles and practical skills in accounting software. The progression from basic accounting concepts to advanced tools like Tally and ERP-9 ensures a gradual and thorough learning experience. By covering topics such as the golden rule, trial balances, GST, and alternative tools, students will be equipped to handle both manual and computerized accounting systems. Practical exercises in Tally and ERP-9 enhance their proficiency, preparing them for real-world accounting tasks and ensuring adaptability in diverse professional settings.

Course Outcome

CO 1: Student will be able to apply fundamental accounting concepts, distinguish manual and computerized systems, and apply the golden rule effectively.
CO 2: Student will be able to prepare financial statements, including trial balances, trading, profit and loss accounts, and balance sheets, addressing outstanding transactions.
CO 3: Student will operate Tally software, from introduction to voucher entries, and effectively manage accounting tasks such as purchase/sales orders and receipts, bills, and journals.
CO 4: Student will be able to use GST tasks like creating masters, handling return of goods, managing exempt transactions, and generating reports for registered and composite dealers.
CO 5: Student will be able to operate, covering Tally Vault, security controls, data import-export, audit procedures, and utilizing online support and help for advanced accounting functions.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours(CI+LI+SW+SL)	
Open Elective	03CA172	**Accounting and Tally**	4	0	2	1	7	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment	Total Marks
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	(ESA)	(PRA + ESA)
Open Elective	03CA172	Accounting and Tally	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion

CO 1 "Student will be able to apply fundamental accounting concepts, distinguish manual and computerized systems, and apply the golden rule effectively."

Approximate Hours

Item	Approx Hrs.
Cl	15
LI	0

SW	2
SL	1
Total	18

Session Outcomes (SOs)	(LI)	Class room Instruction (CI)	(SL)
1. Mastering Basic Accounting Principles 2. Proficiency in Manual Accounting Techniques 3. Understanding the Significance of the Golden Rule 4. Competence in Crafting Effective Journal Entries 5. Capability to Maintain and Analyze Ledger Accounts		1. Basics of Accounting 2. Introduction to Manual Accounting 3. Comparison: Manual vs. Computerized Accounting 4. Understanding the Golden Rule in Accounting 5. Accounting Equation Essentials 6. Importance of Journal Entries 7. Ledger Account Structure 8. Types of Ledger Accounts 9. Financial Transactions Recording 10. Principles of Double-Entry Accounting 11. Closing Entries in Journal 12. Significance of Accounting Concepts 13. Application of the Golden Rule 14. Accounting Equation in Practice 15. Journal Entry Formatting	1. Entry in Accounting system. 2. Explore modern computerized

SW- Suggested Sessional Work (SW):

Assignment: Create a comprehensive journal entry for a complex business transaction.

Mini Project: Prepare a comparative analysis of manual and computerized accounting systems.

Other Activity: Organize a group discussion on the evolving role of technology in accounting practices.

CO 2 "Student will be able to prepare financial statements, including trial balances, trading, profit and loss accounts, and balance sheets, addressing outstanding transactions."

Approximate Hours

Item	Approx Hrs.
Cl	12

LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	(LI)	Class room Instruction (CI)	(SL)
1. Proficiency in Creating a Comprehensive Balance Sheet 2. Competence in Generating and Analyzing Trial Balances 3. Mastery of Final Account Preparation 4. Skill in Crafting Trading and 5. Profit & Loss Accounts		1. Trial Balance Formats 2. Importance of Trial Balance 3. Final Accounts Overview 4. Ledger-Wise Trial Balance 5. Essential Elements of Profit and Loss Account 6. Composition of a Balance Sheet 7. Key Sections of the Trading Account 8. Presentation of the Balance Sheet 9. Trading Account Calculations 10. Structure of Trading Account 11. Comprehensive Profit and Loss Statements 12. Components of a Balance Sheet	1. Learn advanced techniques for analyzing a balance sheet. 2. Explore methods to reconcile trial balances effectively.

SW- Suggested Sessional Work (SW):

Assignment: Prepare a trading account, profit and loss account, and balance sheet for a fictional company.

Mini Project: Conduct a financial health check for a real-world business using trial balance and final accounts.

Other Activity: Organize a group workshop on the interpretation of balance sheets for diverse industries.

CO 3 "Student will operate Tally software, from introduction to voucher entries, and effectively manage accounting tasks such as purchase/sales orders and receipts, bills, and journals."

Approximate Hours

Item	Approx Hrs.
Cl	14
LI	0
SW	2
SL	1
Total	17

Session Outcomes (SOs)	(LI)	Class room Instruction (CI)	(SL)
1. Proficiency in Navigating Tally's Interface 2. Competence in Creating and Managing Companies 3. Mastery of Configuring Accounting Features 4. Skill in Setting Up Account Heads 5. Understanding the Voucher Entry Process		1. Overview of Tally Software 2. Gateway of Tally Functionality 3. Creating a Company in Tally 4. Company Information Menu Exploration 5. Accounting Master Features 6. Configuration in Tally 7. Setting Up Account Heads 8. Voucher Entry Process 9. Purchase and Sales Order Management 10. Handling Receipt Notes 11. Processing Purchase and Sales Bills 12. Debit and Credit Note Entries 13. Journal Voucher Utilization	1. Explore advanced voucher entry techniques in Tally. 2. Learn how to customize Tally based on specific business needs.

		14. Comprehensive Voucher Understanding	

SW- Suggested Sessional Work (SW):

Assignment: Prepare a trading account, profit and loss account, and balance sheet for a fictional Company.

Mini Project: Conduct a financial health check for a real-world business using trial balance and Final accounts.

Other Activity: Organize a group workshop on the interpretation of balance sheets for diverse Industries.

CO 4 "Student will be able to use GST tasks like creating masters, handling return of goods, managing Exempt transactions, and generating reports for registered and composite dealers."

Approximate Hours

Item	Approx Hrs.
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	**(LI)**	**Class room Instruction (CI)**	**(SL)**

1. astery in GST Master Creation 2. Proficiency in Managing Returns of Goods 3. Competence in Exempt Transaction Handling 4. Ability to Process Sales for Registered Dealers 5. Skill in Processing Sales for Composite Dealers		1. Creation of GST Masters 2. Management of Exempt Transactions 3. Sales Process for Registered Dealers 4. Sales Process for Composite Dealers 5. Generation of GST Reports 6. Features of GST in Tally 7. Configuration for GST 8. Setting Up Account Heads for GST 9. Voucher Entries for GST 10. Purchase Bills for GST 11. Sales Bills for GST 12. Debit/Credit Note Journal for GST	1. Configuration of GST 2. Sale voucher with GST

SW- Suggested Sessional Work (SW):

Assignment: Prepare a detailed report on the impact of GST on a specific industry and its accounting implications**.**

Mini Project: Implement GST in Tally for a mock business, ensuring compliance with various GST scenarios.

Other Activity: Conduct a workshop on GST filing procedures using Tally, emphasizing common challenges and solutions.

CO 5 "Student will be able to operate, covering Tally Vault, security controls, data import-export, audit procedures, and utilizing online support and help for advanced accounting functions

Approximate Hours

Item	Approx Hrs.
Cl	7
LI	0
SW	2

SL	1
Total	10

Session Outcomes (SOs)	(LI)	Class room Instruction (CI)	(SL)
1. Proficiency in Utilizing Tally Vault 2. Mastery of Tally Security Controls 3. Competence in Data Import and Export 4. Skillful Tally Audit Implementation 5. Efficient Logging and Control Center Management		1. Introduction to Tally Vault 2. Tally Security Control Features 3. Data Import and Export in Tally ERP-9 4. Tally Audit Procedures 5. Logging in Tally 6. Managing Control Center in ERP-9 7. Online Support and Help Features	1. Advanced features and functionalities. 2. Tally's Control Center. .

SW- Suggested Sessional Work (SW):

Assignment: Conduct a security audit in Tally ERP-9 for a simulated business and propose improvements.

Mini Project: Implement data import/export procedures for a real-world scenario using Tally ERP-9.

Other Activity: Organize a training session on advanced features of Tally ERP-9, focusing on control center management and troubleshooting.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)

CO 1 "Student will be able to apply fundamental accounting concepts, distinguish manual and computerized systems, and apply the golden rule effectively."	15	2	1	18
CO 2 "Student will be able to prepare financial statements, including trial balances, trading, profit and loss accounts, and balance sheets, addressing outstanding transactions."	12	2	1	15
CO 3 "Student will operate Tally software, from introduction to voucher entries, and effectively manage accounting tasks such as purchase/sales orders and receipts, bills, and journals."	14	2	1	17
CO 4 "Student will be able to use GST tasks like creating masters, handling return of goods, managing exempt transactions, and generating reports for registered and composite dealers."	12	2	1	15
CO 5 "Student will be able to operate, covering Tally Vault, security controls, data import-export, audit procedures, and utilizing online support and help for advanced accounting functions	7	2	1	10
Total Hours	60	10	05	75

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	**CO 1** "Student will be able to apply fundamental accounting concepts, distinguish manual and computerized systems, and apply the golden rule effectively."	01	01	03	05
CO-2	**CO 2 "**Student will be able to prepare financial statements, including trial balances, trading, profit and loss accounts, and balance sheets, addressing outstanding transactions."	01	01	03	05
CO-3	**CO 3** "Student will operate Tally software, from introduction to voucher entries, and effectively manage accounting tasks such as purchase/sales orders and receipts, bills, and journals."	-	03	10	13
CO-4	**CO 4** "Student will be able to use GST tasks like creating masters, handling return of goods, managing exempt transactions, and generating reports for registered and composite dealers."	-	03	10	13
CO-5	**CO 5** "Student will be able to operate, covering Tally Vault, security controls, data import-export, audit procedures, and utilizing online support and help for advanced accounting functions	01	03	10	14

Total	03	11	36	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Financial Accounting will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional / Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to IT Industry
7. Demonstration
8. ICTBasedTeachingLearning(VideoDemonstration/TutorialsCBT,Blog,Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

(b) Books:

S. No.	Title	Author	Publisher	Edition &Year
1	Official Guide to Financial Accounting using Tally Erp 9 with GST	-	Tally Education Pvt.Ltd	
2	Tally Essential Level	-	Tally education pvt ltd	
3	Lecture note provided by Dept. of Commerce AKS University, Satna.			

Cos, POs and PSOs Mapping

Course Title: B.SC(IT)
Course Code: 03CA172
Course Title: Accounting and Tally

Course Outcomes	Program Outcomes										Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
	Commerce and business-related areas	Solving the problems	Profession related scenarios	Start-ups and entrepreneurial ventures:	Leadership qualities	Communication through different modes	Advance research in the field of commerce	Decision making	Pathways programs	Environment and sustainability:	Paraphrase the field of E Commerce and digital platforms	Articulate in the area of corporate sectors and its operations.	Enhance the skills of Entrepreneurial attitude and create an impact on social life	Demonstrate knowledge in setting up e-commerce platforms	Design the system and processes essentially required for e-commerce
CO 1 "Student will be able to apply fundamental accounting concepts, distinguish manual and computerized systems, and apply the golden rule effectively."	3	2	3	1	1	1	3	1	1	**1**	**3**	**3**	**1**	**2**	**1**
CO 2 "Student will be able to prepare financial statements, including trial balances, trading, profit and loss accounts, and balance sheets.	3	2	**3**	**1**	**1**	**1**	3	1	**1**	**1**	**2**	**3**	**1**	**1**	**1**
CO 3 "Student will operate Tally software, from introduction to voucher entries, and effectively manage account in.	3	2	**1**	**2**	**1**	**1**	3	1	**2**	**1**	**3**	**3**	**2**	**1**	**1**
CO 4 "Student will be able to use GST tasks like creating masters, handling return of goods.	3	3	**1**	**3**	**1**	**1**	3	1	**1**	**1**	**3**	**3**	**2**	**1**	**1**
CO 5 "Student will be able to operate, covering Tally Vault, security controls, data import-export.	3	2	**3**	**1**	**1**	**1**	3	1	**1**	**1**	**1**	**2**	**3**	**1**	**1**

Legend: 1–Slight (Low),2–Medium, 3–High

Course Curriculum Map:

POs &PSOsNo.	COsNo.&Titles	SOsNo.	(LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO1,2,3,4,5,6 7,8,9,10, PSO 1,2, 3, 4, 5	**CO 1** "Student will be able to apply fundamental accounting concepts, distinguish manual and computerized systems, and apply the golden rule effectively."	SO1.1SO1 .2SO1.3S O1.4 SO1.5		Unit 1. Introduction Accounting 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.81.9,1. 10,1.11,1.12,1.13,1.14,1.15	As mentioned in page number 3 to 7
PO1,2,3,4,5,6 7,8,9,10, PSO 1,2, 3, 4, 5	**CO 2** "Student will be able to prepare financial statements, including trial balances, trading, profit and loss accounts, and balance sheets, addressing outstanding transactions."	SO2.1SO2 .2SO2.3 SO2.4 SO2.5		Unit-2 Ledger Trial balance, Final Account 2.1,2.2,2.3,2.4,2.5,2.6, 2.7, 2.8,2.9,2.10,2.11,2.12	
PO1,2,3,4,5,6 7,8,9,10, PSO 1,2, 3, 4, 5	**CO 3** "Student will operate Tally software, from introduction to voucher entries, and effectively manage accounting tasks such as purchase/sales orders and receipts, bills, and journals."	SO3.1SO3 .2 SO3.3 SO3.4 SO3.5		Unit-3: Intro tally 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8, 3.9,3.10,3.11,13.12,3.13,3.14	
PO1,2,3,4,5,6 7,8,9,10, PSO 1,2, 3, 4, 5	**CO 4** "Student will be able to use GST tasks like creating masters, handling return of goods, managing exempt transactions, and generating reports for registered and composite dealers."	SO4.1SO4 .2SO4.3S O4.4 SO4.5		Unit-4 GST Vouching 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8, 4.9,4.10,4.11,4.12	
PO1,2,3,4,5,6 7,8,9,10, PSO 1,2, 3, 4, 5	**CO 5** "Student will be able to operate, covering Tally Vault, security controls, data import-export, audit procedures, and utilizing online support and help for advanced accounting functions	SO5.1SO5 .2SO5.3S O5.4 SO5.5		Unit 5: Tally Control 5.1,5.2,5.3,5.4,5.5,5.6,5.7,	

AKS University

Faculty of Computer Application and Science & Technology

Department of Computer Application and Science & Technology

Curriculum of B.Sc. (IT) [Program

(Revised as on 01 August 2023)

Semester-II

Course Code: 0SSD02

Course Title: Communication Skills

Pre-requisite: Students must have basic knowledge of English language.

Rationale: In order to compete in this fast-growing world, LSWR skills of the students should be well developed and enhanced. Besides, they must have effective communication skills as it plays a vital role in shaping individual's personality and career. It also boosts the confidence and prepares them to face the audience fearlessly.

Course Outcomes:

After completion of the course:

0SSD02.1 Students will be able to speak confidently in public as all the topics chosen emphasis on improvingSpeaking skills and developing self confidence amongst them.

0SSD02.2 Students will be able to interact properly with improved Leadership Skills, Problem Solving Skills, Social skills and Communication Skills. Students will also be able to understand the Importance of Team Work.

0SSD02.3. Students will be able to communicate effectively in Hindi and English languages without hindrances.

0SSD0 2.4. .Students will be able to convey their messages accurately by understanding the significance of grammaras it plays a vital role in improving speaking and writing skills.

0SSD02.5. The Understanding of Indian Culture and English Language will be developed through the study ofDramas and Poems written by Indian Writers.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits(C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Foundation	0SSD02	**Communication skills**	2	0	1	1	4	2

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) *and* others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						**End Semester Assessment (ESA)**	**Total Marks** (PRA+ESA)
			Class/HomeAssignment5 number 3 marks each (CA)	Class Test 2 (2 best out Of 3) 10	Seminar one **(Presentation)** (SA)	Class Activity any	Class Attendance	Total Marks (CA+CT+SA+CAT		
PCC	0SSD02	Communication Skills	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

CO1: Students will be able to speak confidently in public as all the topics chosen emphasis on improving speaking skills and developing self confidence amongst them.

Approximate Hours

Item	Appx. Hrs.
Cl	6
LI	0
SW	1
SL	1
Total	8

Session Outcomes (SOs)	**Laboratory Instruction(LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO1.1 Students will be able to introduce themselves		**Unit 1- Self-grooming, Basic Etiquettes and Presentation Skill**	1. Prepare a presentation on the given topics.

SO1.2 Understand the concept of Oral Presentation SO1.3 Students will be able to dress and present effectively SO1.4 Understand the importance of Body Language SO1.5 Students will be able to influence mass through skit and dramas.		1.1 Self-introduction 1.2 Oral Presentation, Oral Presentation on: The importance of Education 1.3 The importance of English in Today's World, Necessity of uniforms in a college 1.4 Professional dressing and grooming etiquettes. Body Language tips and techniques. 1.5 Role play, Role play was conducted on following topics: Classroom interaction, 1.6 Hospital Scene and Scene at Railway station.	2. Prepare a play on the given topics.

CO2: Students will be able to interact properly with improved Leadership Skills, Problem Solving Skills, Social skills and Communication Skills. Students will also be able to understand the Importance of Team Work.

Approximate Hours

Item	Appx. Hrs.
Cl	7
LI	0
SW	1
SL	1
Total	9

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO2.1 Understand the techniques of Group		**UNIT 2 – Confidence building skills,**	1. Prepare

Discussion **SO2.2** Understand the concept of Debate **SO2.3** Students will be able to design a professional resume and crack interview **SO2.4** Explain the concept of how to ace in an interview.		**Interview Skills and Resume Writing** 2.1. Group Discussion, Group Discussion on impact of covid 19 2.2. Group Discussion on mental health, Group Discussion impact of social media 2.3. Group Discussion on lives, pros and cons of technology 2.4. Students will be able to present debate Debate on effectively on (Should the Use of Plastic Be Banned? Debate on: Should Parents Decide Which Career Their Children Will Pursue? 2.5. . Debate on: Is Artificial Intelligence Useful or Dangerous?) 2.6. Interviews and their Kinds Mock Interview Session 2.7. Resume Writing.	debate on given topics 2. Prepare a Resume

CO3: Students will be able to communicate effectively in Hindi and English languages without hindrances.

Approximate Hours

Item	Appx. Hrs.
Cl	6
LI	0
SW	1
SL	1
Total	8

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO3.1 Students will be able to organize and prepare speeches.	.	**Unit-3: Public Speaking Skills& Conversational Skills**	1. Prepare a Speech on the following topics.

SO3.2 Students will be able to think and speak instantaneously. **SO3.3** To make them understand the inquiry procedure at public places. **SO3.4** To enable them to communicate effectively Through phones.		3.1 Speech/Anchoring, Speech/Anchoring on National Science Day 3.2 Valedictory Speech, Patriotic speech 3.3 Extempore, Extempore (Pros and Cons of Online teaching 3.4 Extempore : Environment Conservation and Extempore : Education of a Girl Child) 3.5 Conversational Topics (Inquiry at bank, Airport, Station and Hospitals). Telephonic Conversation(Describing about Your College Day to Your Parents from Hostel 3.6 Talking with Customer Care Executive Of Any E-Commerce company).	2. Prepare on the following conversational topics.

CO.4: Students will be able to convey their messages accurately by understanding the significance of grammar as it plays a vital role in improving speaking and writing skills.

Approximate Hours

Item	AppXHrs
Cl	6
LI	0
SW	1
SL	1
Total	8

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO4.1 Understanding about the use of Prepositions. **SO4.2**Students will be able to understand the usage of Tenses **SO4.3**Undesrtand the concept of Active and Passive Voice **SO4.4**To understand the usage of Modals		Unit-4: Functional Grammar and Vocabulary Building 4.1. Prepositions: Place 4.2. Time 4.3. Direction 4.4. Tenses: Present, Past, Future 4.5. Voice (Active and Passive) 4.6. Modals.	1. Prepare the Structure of Tenses and Active Passive. 2. Prepare 250 Vocabularies.

CO.5: The Understanding of Indian Culture and English Language will be developed through the

Study of Dramas and Poems written by Indian Writers.

Approximate Hours

Item	Appx. Hrs.
Cl	5
LI	0
SW	1
SL	1
Total	7

Session Outcomes (SOs)	**Laboratory Instruction(LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**
SO5.1 Students will be able to understand the value of Indian Literature (R.K. Narayan) **SO5.2** Students will be able to understand the value of Indian Literature (Nissim Ezekiel) **SO5.3** Students will be able to understand the value of Indian Literature (Khushwant Singh) **SO5.4** Students will be able to understand the value of Indian Literature (Mulk Raj Anand) **SO5.5** Students will be able to understand the value of Indian Literature (Prem Chand)		**Unit 5-Indian Writing in English& Hindi** 5.1. The Axe- R.K. Narayan 5.2. The Night of the Scorpion- Nissim Ezekiel 5.3. The Portrait of a Lady -Khushwant Singh 5.4. The Lost Child- Mulk RajAnand 5.5. The Shroud- Prem Chand	1. Prepare the summary of all thetopics (The Axe, The Night of the Scorpion, The Portrait of a Lady,The Lost Child he Shroud).

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
CO.1: Students will be able to speak confidently in public as all the topics chosen emphasis on improving speaking skills and developing self confidence amongst Them.	6	1	1	8

CO..2: Students will be able to interact properly with improved Leadership Skills, Problem Solving Skills, Social skills and Communication Skills. Students will also be able to understand the Importance of Team Work.	7	1	1	9
CO.3: Students will be able to communicate effectively in Hindi and English languages without hindrances.	6	1	1	8
CO.4: Students will be able to convey their messages accurately by understanding the significance of grammar as it plays a vital role in improving speaking and writing Skills.	6	1	1	8
CO.5: The Understanding of Indian Culture and English Language will be developed through the study of Dramas and Poems written by Indian Writers.	5	1	1	7
Total Hours	**30**	**5**	**5**	**40**

Suggested Specification Table (For ESA)

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Group Discussion
4. Role play
5. Presentations
6. Extempore
7. Speeches
8. Brainstorming

Suggested Learning Resources:

(a) Books:

S. No.	Title	Author	Publisher	Edition &Year
1	Communication Skills	Dr. Meenu Pandey	Nirali Praksahan.	2020
2	A Practical Guide to English Grammar	K.P. Thakur	Bharti Bhawan Publishers & Distributors.	2018
3	Living English Structure	W. StannardAllen	Dorling Kindersley India Pvt. Ltd.	Fifth Edition,
4	Communication Skills for Engineers	Muralikrishna C., Sunita Mishra	Pearson, New Delhi.	Second edition (2010)
5.	Advanced Language Practice,	Michael Vince	Macmillan Education, Oxford	2003.
6.	English Conversation Practice	Grant Taylor	Tata McGraw Hill Education Private Limited.	1967
7.	Six Weeks to Words of Power	Wilfred Funk	W.R. Goyal Publishers and Distributors.	1990

Curriculum Development Team Curriculum Development Team

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7. Dr. Pinki Sharma, Assistant Professor, Department of Computer Science and Engineering.

COs, POs and PSOs Mapping

Program: B.SC(IT)
Course Code : 0SSD02
Course Title: English Communication

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1: Analyzing the graph of a function is a powerful way to understand its behavior, make predictions, and solve mathematical and real-world problems.	-	-	-	-	1	1	1	2	3	3	1	-	2	3	3	1	2
CO 2 : Discuss of Derivatives and optimization are closely related concepts in mathematics and have important applications in various fields, engineering, and machine learning.	-	1	1	-	-	2	2	2	3	3	2	-	2	2	2	1	3
CO 3: Use of operations involving vectors and matrices depend on the specific operations being performed.	-	-	-	-	-	-	-	-	2	3	1	-	1	1	2	2	2
CO 4: Use and apply hypothesis testing on different datasets.	-	-	-	-	-	-	-		1	3	-	-	3	3	3	2	2
CO 5: Use statistical methods to analyze and Collect data.	-	-	1	-	-	1	-	-	1	3	-	-	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: Students will be able to speak confidently in public as all the topics chosen emphasis on improving speaking skills and developing self confidence amongst them.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		Unit-1 Self-grooming, Basic Etiquettes andPresentation Skill 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2 : Students will be able to interact properly with improved Leadership Skills, Problem Solving Skills, Social skills and Communication Skills. Students will also be able to understand the Importance of Team Work.	SO2.1 SO2.2 SO2.3 SO2.4		Unit-2 Confidence building skills, InterviewSkills and Resume Writing 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9,2.10	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 3: Students will be able to communicate effectively in Hindi and English languages without hindrances	SO3.1 SO3.2 SO3.3 SO3.4		Unit-3 Public Speaking Skills& Conversational Skills 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,3.10, 3.11,3.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 4: Students will be able to convey their messages accurately by understanding the significance of grammar as it plays a vital role in improving speaking and writing skills.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5		Unit-4 Functional Grammar and Vocabulary Building 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10, 4.11,4.12,4.13,4.14	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 5: The Understanding of Indian Culture and English Language will be developed through the study of Dramas and Poems written by Indian Writers	SO5.1 SO5.2 SO5.3 SO5.4		Unit-5 **Indian Writing inEnglish& Hindi** Statistics 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10, 5.11,5.12,5.13,5.14,5.15	

AKS University

Faculty of Computer Application and Science & Technology
Department of Computer Application and Science & Technology
Curriculum of B.Sc. (IT) [Program
(Revised as on 01 August 2023)

Semester-II

Course Code: **0IKS04**
Course Title: **Indian Knowledge System**
Pre- requisite: Creating awareness among the youths about the true history and past rich culture of India.
Rationale: India has very rich and versatile knowledge system and cultural heritage since antiquity. The Indian Knowledge systems was developed on life science, medical science, literature, drama, art, music, dance, astronomy, mathematics, architecture (Sthapatyaveda), chemistry, aeronautics etc, during ancient period. In this basic course, a special attention is given to the ancient and historical perspective of ideas occurrence in the ancient society, and implication to the concept of material world and religious, social and cultural beliefs. On the closer examination, religion, culture and science have appeared epistemological very rigidly connected in the Indian Knowledge System. This land of Bharat Bhumi has provided invaluable knowledge stuff to the society and the world in all sphere of life.

Course Outcomes:

0IKS04. 1: To understand the ancient civilization, Indian Knowledge Systems, Concept of Panch Mahabhuta, Origin of name Bharat Varsha, Ancient Rivers, Ancient Universities and ancient agriculture.

0IKS04.2: Students will have the ability to learn about ancient books, Religious places, basic concept of Indian dance, music and arts, and fundamental aspects of Sangeeta and Natyashashtra etc.

0IKS04.3: Student will be able to gain knowledge on Vedic Science, Astronomy, Astrovastu, Vedic Mathematics, Aeronautics, Metallurgy, Nakhatras, Panchang, Concept of Zero, Pi and point etc.

0IKS04.4: Understanding on ancient Engineering, Science and Technology, Town Planning, Temple architecture, Chemistry and Metallurgy, Metal manufacturing etc.

0IKS04.5: Student will able to understand about the Life, Nature and Health through basic concept of Ayurveda and Yoga, Traditional Medicinal Systems, Ethnomedicine, Nature conservation, World Heritage Sites etc.

Scheme of Studies:

Category of Course,	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours CI+LI+SW+SL	
Foundation	01IKS 04	Indian Knowledge System	2	0	1	1	4	2

Legend:
CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial

(T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Session Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Proposed examination scheme (Marking) as per the recommendation of University Grant Commission (UGC) for Under Graduate Courses in Fundamentals of Indian Knowledge Systems 2022-23 onwards

Scheme of Assessment:

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ESA)
			Class/HomeAssignment5 number 3 marks each (CA)	Class Test 2 (2 best out Of 3) 10	Seminar one **(Presentation)** (SA)	Class Activity any	Class Attendance	Total Marks (CA+CT+SA+CAT		
Foundation	0IKS04	Indian Knowledge System	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

0IKS04**. 1. To understand Indian Civilization and Indian Knowledge Systems**

Approximate Hours

Item	Approximate Hours
CI	**6**
LI	**0**
SW	**2**
SL	**1**
Total	**9**

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO 1.1. Understand Overview of Indian Knowledge Systems (IKS) SO 1.2. Understand Classification of Ancient IKS texts SO 1.3. Understand Introduction to Panch Mahabhutas (Earth, Water, Fire, Sky and Air) SO 1.4. Understand Origin of the name Bharatvarsha: the Land of Natural Endowments SO 1.5. Understand Rivers of ancient India (The Ganga,Yamuna, Godawari, Saraswati, Narmada, Sindhu and Kaveri) SO 1.6. Understand Ancient Agriculture and ancient Universities: Takshashila and Nalanda, Gurukul system		**Unit-1. Indian Civilization and Indian Knowledge Systems** 1.1.Overview of Indian Knowledge Systems (IKS) 1.2 Classification of Ancient IKS texts 1.3 Introduction to Panch Mahabhutas (Earth, Water, Fire, Sky and Air) 1.4 Origin of the name Bharatvarsha: the Land of Natural Endowments 1.5 Rivers of ancient India (The Ganga, Yamuna, Godawari, Saraswati, Narmada, Sindhu and Kaveri) 1.6 Agriculture system in ancient India, Ancient Universities: Takshashila and Nalanda, Gurukul system	Golden era of ancient India

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Concepts of Panch Mahabhuta, Classification of ancient texts, origin of ancient rivers

b. Mini Project:

i. Ancient Universities: Takshashila and Nalanda,

c. Other Activities (Specify):

0IKS04**. 2: Students will have the ability to apply the knowledge gained about Indian Art, Literature and Religious Places**

Approximate Hours

Item	Approximate Hours
CI	6
LI	0
SW	2
SL	1
Total	**9**

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO 2.1. Understand the Ancient Indian Books: Vedas, Puranas, Shastras, Upanishads, Mahakavyas (Ramayana & Mahabharata), Smrities, Samhitas SO 2.2. Understand the Religious places: Puries, Dhams, Jyotiralinga, Shaktipeeths, Kumbha Mela SO 2.3. Understand the Legendary places of Madhya Pradesh: Ujjain, Chitrakoot, Omkareshwar, Bharhut, Maihar SO 2.4. Understand the Basic concept of Indian Art, Music and Dance, Indian Musical Instruments SO 2.5. Understand the Fundamental aspects of		**Unit-2. Indian Art, Literature and Religious Places** 2.1. Ancient Indian Books: Vedas, Puranas, Shastras, Upanishads, Mahakavyas (Ramayana & Mahabharata), Smrities, Samhitas 2.2. Religious places: Puries, Dhams, Jyotiralinga, Shaktipeeths, Kumbha Mela 2.3. Legendary places of Madhya Pradesh: Ujjain, Chitrakoot, Omkareshwar, Bharhut, Maihar 2.4. Basic concept of Indian Art, Music and Dance, Indian Musical Instruments	**1.** Indian Art, Music and Dance

Sangeeta and Natya shastra SO 2.6. Understand the different schools of music, dance and painting in different regions of India		2.5. Fundamental aspects of Sangeeta and Natya shastra 2.6. Different schools of music, dance and painting in different regions of India	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. Visit of Chitrakoot, Maihar and Bharhuta

b. Mini Project:

ii. Kumbhmela, Story of Ramayana and Mahabharata

c. Other Activities (Specify):

0IKS04**. 3: Student will be able to understand Ancient Science, Astronomy and Vedic Mathematics**

Approximate Hours

Item	Approximate Hours
CI	**6**
LI	**0**
SW	**2**
SL	**1**
Total	**9**

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO 3.1. Understand Vedic Cosmology SO 3.2. Understand the Astronomy, Astrovastu, Vedang Jyotish, Nakshatras, Navagraha, Rashis, Vastushastra and		**Unit-3. Ancient Science, Astronomy, Mathematics** 3.1. Vedic Cosmology 3.2. Astronomy, Astrovastu, Vedang Jyotish, Nakshatras, Navagraha,	1. Ancient Science, Astronomy and Vedic Mathematics

their related plants SO 3.3. Understand the Time and Calendar, Panchang SO 3.4. Understand the Concept of Zero, Point, Pi -number system, Pythagoras SO 3.5. Understand the Vedic Mathematics, Vimana-Aeronautics, Basic idea of planetary model of Aryabhatta SO 3.6. Understand the Varanamala of Hindi language based on classification of sounds on the basis of their origin, Basic purpose of science of Vyakarana		Rashis, Vastushastra and their related plants 3.3. Time and Calendar, Panchang 3.4. Concept of Zero, Point, Pi -number system, Pythagoras 3.5. Vedic Mathematics, Vimana-Aeronautics, Basic idea of planetary model of Aryabhatta 3.6. Varanamala of Hindi language based on classification of sounds on the basis of their origin, Basic purpose of science of Vyakarana.	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Varanamala of Hindi language based on classification of sounds on the basis of their origin

b. Mini Project:

1. Nakshatras, Navagraha and their related plants

c. Other Activities (Specify):

0IKS04**. 4: Understand the Engineering, Technology and Architecture**

Approximate Hours

Item	Approximate Hours
CI	6
LI	0
SW	2
SL	1
Total	**9**

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO 4.1. Understand the Engineering Science and Technology in Vedic and Post Vedic Era SO 4.2. Understand the Town and Home planning, Sthapatyaveda SO 4.3. Understand the Chemistry and Metallurgy as gleaned from archeological artifacts SO 4.4. Understand the Chemistry of Dyes, Pigments used in Paintings, Fabrics, Potteries and Glass SO 4.5. Understand the Temple Architecture: Khajuraho, Sanchi Stupa, Chonsath Yogini temple SO 4.6. Understand the Mining and manufacture in India of Iron, Copper, Gold from ancient times		**Unit-4. Engineering, Technology and Architecture** 4.1. Engineering Science and Technology in Vedic and Post Vedic Era 4.2. Town and Home planning, Sthapatyaveda 4.3. Chemistry and Metallurgy as gleaned from archeological artifacts 4.4 Chemistry of Dyes, Pigments used in Paintings, Fabrics, Potteries and Glass 4.5. Temple Architecture: Khajuraho, Sanchi Stupa, Chonsath Yogini temple 4.6. Mining and manufacture in India of Iron, Copper, Gold from ancient times	2. Ancient Science, Astronomy and Vedic Mathematics

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. Varanamala of Hindi language based on classification of sounds on the basis of their origin

b. Mini Project:

i. Nakshatras, Navagraha and their related plants

c. Other Activities (Specify):

0IKS04**. 5: Understand about the Life, Nature and Health**

Approximate Hours

Item	Approximate Hours
CI	6
LI	0

SW	2
SL	1
Total	**9**

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO 5.1. Understand the Fundamentals of Ayurveda (Charaka & Shushruta) and Yogic Science (Patanjali), Ritucharya and Dinacharya SO 5.2. Understand the Traditional system of Indian medicines (Ayurveda, Siddha, Unani and Homoeopathy) SO 5.3. Understand Fundamentals of Ethnobotany and Ethnomedicines of India SO 5.4. Understand the Nature Conservation in Indian ancient texts SO 5.5. Understand the Introduction to Plant Science in Vrikshayurveda SO 5.6. Understand the World Heritage Sites of Madhya Pradesh: Bhimbetka, Sanchi, Khajuraho		**Unit-5. Life, Nature and Health** 5.1. Fundamentals of Ayurveda (Charaka & Shushruta) and Yogic Science (Patanjali), Ritucharya and Dinacharya 5.2. Traditional system of Indian medicines (Ayurveda, Siddha, Unani and Homoeopathy) 5.3. Fundamentals of Ethnobotany and Ethnomedicines of India 5.4. Nature Conservation in Indian ancient texts 5.5 Introduction to Plant Science in Vrikshayurveda 5.6. World Heritage Sites of Madhya Pradesh: Bhimbetka, Sanchi, Khajuraho	1. Concept of Ayurveda and Yoga 2. Traditional system of Indian medicines 3. Ethnobotany and Ethnomedicines of India 4. World Heritage Sites

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. Visit to world Heritage Site Khajuraho

b. Mini Project:

i. Ritucharya and Dincharya, Ethnomedicinal plants

c. Other Activities (Specify):

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
CO.1: To understand Indian Civilization and Indian Knowledge Systems	**6**	**2**	**1**	**9**
CO. 2: Students will have the ability to apply the knowledge gained about Indian Art, Literature and Religious Places	**6**	**2**	**1**	**9**
CO. 3: Student will be able to understand the Ancient Science, Astronomy and Vedic Mathematics	**6**	**2**	**1**	**9**
CO. 4: Understand the Engineering, Technology and Architecture	**6**	**2**	**1**	**9**
CO. 5: Understand about the Life, Nature and Health	**6**	**2**	**1**	**9**
Total	**30**	**10**	**5**	**45**

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO 1	Indian Civilization and Indian Knowledge Systems	**2**	**5**	**1**	**8**
CO 2	Indian Art, Literature and Religious Places	**2**	**6**	**2**	**8**
CO 3	Ancient Science, Astronomy and Vedic Mathematics	**2**	**6**	**5**	**13**
CO 4	Engineering, Technology and Architecture	**2**	**4**	**4**	**10**
CO 5	Life, Nature and Health	**2**	**5**	**2**	**9**
Total		**10**	**26**	**14**	**50**

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for **Indian Knowledge Systems** will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course teacher for above tasks. Teacher can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial

3. Case Method
4. Group Discussion
5. Role Play
6. Visit to Religious places, World Heritage Sites
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:
(a) Books:

S. No.	Title	Author	Publisher	Edition & Year
1	An Introduction of Indian Knowledge Systems: Concept and Applications	Mahadevan, B.; Bhat V. R. and Pavana, Nagendra R. N.	Prentice Hall of India.	2022
2	Indian Knowledge Systems: Vol. I and II.	Kapoor, Kapil and Singh, A. K.	D.K. Print World Ltd	2005
3	Science of Ancient Hindus: Unlocking Nature in Pursuit of Salvation	Kumar, Alok	Create pace Independent Publishing	2014
4	A History of Agriculture in India	Randhava, M.S.	ICAR, New Delhi	1980
5	Panch Mahabhuta,	Yogcharya, Jnan Dev	Yog Satsang Ashram	2021
6	The Indian Rivers	Singh, Dhruv Sen	Springer	2018
7	The Wonder That Was India	Basam, Arthue Llewllyn	Sidgwick & Jackson	1954
8	Ancient Cities, Sacred Skies: Cosmic Geometries and City Planning in Ancient India	Malville, J. MacKim & Gujaral, Lalit M.	IGNCA & Aryan Books International, New Delhi	2000
9	The Natya Shastra of Bharat Muni	Jha, Narendra	Innovative Imprint, Delhi	2023
10	Astronomy in India: A Historical Perspective	Padmanabhan, Thanu	Indian National Science Academy, New Delhi & Springer	2010

			(India).	
11	History of Astronomy in India 2nd Ed.	Sen, S.N. and Shukla, K.S.	INSA New Delhi	2001
12	History of Indian Astronomy A Handbook	Ramasubramanian, K.; Sule, Aniket and Vahia, Mayank	Science and Heritage Initiative, I.I.T. Mumbai and Tata Institute of Fundamental Research, Mumbai	2016
13	Indian Mathematics and Astronomy: Some Landmarks	Rao, Balachandra S.	Jnana Deep Publications, Bangalore, 3rd Edition	. 2004
14	Vedic Mathematics and Science in Vedas	Rao, Balachandra S.	Navakarnataka Publications, Bengaluru	2019
15	A History of Hindu Chemistry	Ray, Acharya Prafulla Chandra	Repbl Shaibya Prakashan Bibhag, Centenary Edition, Kolkata	1902
16	Early Indian Architecture: Cities and City Gates	Coomeraswamy, Anand	Munciram Manoharlal Publishers	2002
17	Theory and Practices of Temple Architecture in Medieval India: Bhojas samrangasutradhar and the Bhojpur Line Drawings	Hardy, Adams	Dev Publishers & Distributors.	2015
18	Indian Science and Technology in Eighteenth Century	Dharmpal	Academy of Gandhian Studies, Hyderabad.	1971
19	Science in India: A Historical Perspective	Subbarayappa, B.V.	Rupa New Delhi	2013
20	Fine Arts & Technical Sciences in Ancient India with special reference to Someswvara's Manasollasa	Mishra, Shiv Shankar	Krishnadas Academy, Varanasi	1982
21	Fundamental Principles of Ayurveda, Volume One	Lad, Vasant D.	The Ayurvedic Press, Alboquerque, New Mexico.	2002
22	Charak Samhita, Chaukhamba	Pandey, Kashinath and Chaturvedi Gorakhnath	Vidya Bhawan, Varanasi	

23	Ayurveda: The Science of Self-Healing	Lad, Vasant D.	Lotus Press: Santa Fe	1984
24	Ayurveda: Life, Health and Longevit	Svoboda, Robert E	Penguin: London	1992
25	Plants in the Indian Puranas	Sensarma, P.	Naya Prokash, Calcutta	1989
26	Indian Cultural Heritage Perspective for Tourism	Singh, L. K.	Gyan Publishing House, Delhi	2008
27	Glimpses of Indian Ethnobotany	Jain, S.K.	Oxford & IBH Publishing Company Private Limited, New Delhi	1981
28	Manual of Ethnobotany	Jain, S.K.	Scientific Publishers, Jodhpur	2010

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CO, PO and PSO Mapping

Program: B.Sc.(IT)

Course Code : 0IKS04

Course Title: Indian Knowledge System

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
	Engineering knowledge	Problem Analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science
IKS. 1: To understand Indian Civilization and Indian Knowledge Systems	2	2	3	1	1	1	1	1	1	1	1	2	2	2	2	2
IKS. 2: Students will have the ability to apply the knowledge gained about Indian Art, Literature and Religious Places	2	3	2	1	2	2	1	1	1	1	1	1	3	2	3	2
IKS. 3: Student will be able to understand the Ancient Science, Astronomy and Vedic Mathematics	2	2	2	2	2	2	1	1	1	1	1	2	1	2	1	2
IKS. 4: Understand the Engineering, Technology and Architecture	3	2	3	3	2	3	1	2	2	1	2	3	3	3	2	1
IKS. 5: Understand about the Life, Nature and Health	3	2	3	2	3	2	1	2	1	1	2	3	2	3	2	1

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO. 1:** To understand Indian Civilization and Indian Knowledge Systems	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-1. Indian Civilization and Indian Knowledge Systems** 1.1,1.2,1.3,1.4,1.5,1.6	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO. 2:** Students will have the ability to apply the knowledge gained about Indian Art, Literature and Religious Places	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5		**Unit-2. Indian Art, Literature and Religious Places** 2.1, 2.2, 2.3, 2.4, 2.5,2.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO. 3:** Student will be able to understand the Ancient Science, Astronomy and Vedic Mathematics	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5		**Unit-3. Ancient Science, Astronomy, Mathematics** 3.1,3.2,3.3,3.4,3.5,3.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO. 4:** Understand the Engineering, Technology and Architecture	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5		**Unit-4. Engineering, Technology and Architecture** 4.1,4.2,4.3,4.4,4.5,4.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO. 5:** Understand about the Life, Nature and Health	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5		**Unit-5. Life, Nature and Health** 5.1,5.2,5.3,5.4,5.5,5.6	

AKS University

Faculty of Computer Application and Science & Technology

Department of Computer Application and Science & Technology

Curriculum of B.Sc. (IT) [Program

(Revised as on 01 August 2023)

Semester-II

Course Code: 01CA212

Course Title: Problem Solving using Python Programming

Pre-requisite: This course should help the students to understand the basic knowledge of Problem-Solving using Python Programming. Also, the students should be able to know about basic functioning python

Rationale: The students studying Computer Science and Engineering should possess foundational understanding about Python Programming This encompasses familiarity with the invention and evolution of Computer. Additionally, students ought to acquire fundamental insights into various technologies used in Computer and their applications.

Course Outcomes:

01CA212.1: Write simple Python Program using common data structures
01CA212.2: Use files for data input and output
01CA212.3: Make use of sequences and standard libraries in Programming
01CA212.4: Apply object Oriented Programming concepts in problem solving.
01CA212.5: Application development in python programming

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Major	01CA212	Problem Solving using Python Programming	4	4	1	1	10	6

Legend:

CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning, **C:** Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Boa	Cou	Course	Scheme of Assessment (Marks)

AKS University

Faculty of Computer Application and Science & Technology

Department of Computer Application and Science & Technology

Curriculum of B.Sc. (IT) [Program

(Revised as on 01 August 2023)

Rd of Study	se Cod e	Title	**Progressive Assessment (PRA)**						**End Semest er Assess ment (ESA)**	**Tot al Mar ks** (PR A+ ESA)
			Class/H ome Assign ment 5 number 3 marks each (CA)	Cla ss Tes t 2 (2 best out of 3) 10 mar ks eac h (CT)	Semi nar one (SA)	Class Acti vity any one (CA T)	Clas s Atte nd ance (AT)	Total Marks (CA+CT+SA +C AT+AT)		
Major	01 CA 212	Problem Solving using Python Program ming	15	20	5	5	5	50	50	100

Practical

Board of Study	**Couse Code**	**Course Title**	**Scheme of Assessment (Marks)**						
			Progressive Assessment (PRA)					**End Semester Assessment (ESA)**	**Total Marks** (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	**Viva1 (5)**	**Viva2 (5) (SA)**	**Class Attendance (AT)**	**Total Marks (CA+CT+SA+ CAT+AT)**		
Major	01 CA 212	Problem Solving using Python Programming	35	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

AKS University

Faculty of Computer Application and Science & Technology

Department of Computer Application and Science & Technology

Curriculum of B.Sc. (IT) [Program

(Revised as on 01 August 2023)

01CA212**.1: Write simple Python Program using common data structures**

Approximate Hours

Item	AppXHrs
Cl	14
LI	12
SW	1
SL	1
Total	28

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self Learning (SL)
SO1.1 Understand the basic Python Programming **SO1.2** Understand the basic variables and datatypes **SO1.3** Understand the various looping, conditional, iterative statement and I/O functions **SO1.4** Adding, deleting, processing set elements **SO1.**5 Know about Different set operations	1.1Write a Python Program which accepts the radius of a circle from the use And compute the area. 1.2Write a Python Program which acceptsthe user's first and last name and print the min Reverse order with a space between them. 1.3Write a Python Program to print the Calendar of a given month and Year 1.4 Write a python program to print fabonicci series. 1.5 Write a python program to print table of given number 1.6 Write a python program to demonstare use of if-else.	**Unit 1:** Programming Concepts and Python Basics**:** 1.1 Program designing using pseudo code and flowcharts, 1.2 Basic Python Syntax. 1.3 Literal Constants, Numbers. 1.4 Variable and Basic datatypes. 1.5 String, Escape Sequences, 1.6 Operators and Expressions 1.7 Evaluation Order, Indentation. 1.8 Input Output Functions, Comments. 1.9 Conditional Statements-If, If- else, Nested If- else 1.10 Iterative Statement — For, While, Nested Loops 1.11 Control statements — Break, Continue, lamda, Sets 1.12 Adding, deleting, 1.13 Processing set elements 1.14 Different set operations	1. Understand the Basic Python Programming 2. About dictionary

SW-1 Suggested Sessional Work (SW):

Assignments:

- **a.** Write a Python **Program** which accepts the radius of a circle from the user and compute the area.
- **b.** Write a Python **Program** which accepts the user's first and last name and print them in reverse order with a space between them.
- **c.** Write a Python **Program** to print the calendar of a given month and **Year**.
- **d.** Write a Python **Program** to find whether a given number is prime or not.
- **e.** Write a Python **Program** to find factorial of a number.
- **f.** Write a Python **Program** to find the least common multiple (LCM) of two positive integers.
- **g.** Write a Python **Program** to count occurrence (frequency) of a number in a given list.
- **h.** Write a Python **Program** to find the length of string

01CA212**.2:** Use files for data input and output

Approximate Hours

Item	AppXHrs
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO2.1 To Understand the String, function **SO2.2**To learn about String Indexing slicing, modifying. **SO2.3**To understand the Join Function and passing parameter	2.1 Write a Python Program to count an occurrence (frequency) of a numbering given list.	**Unit-2 String Handling in python** 2.1 Strings, Function 2.2 File Handling, 2.3 String Indexing, Slicing, Modify 2.4 Concatenate, find, replace	i. About String handling ii. About File Handling

SO2.4 To understand the File handling in python programming **SO2.**5 To learn about the Operations on arrays and matrix.	2.2 Write a Python Program to find the length of string 2.3 Write a Python Program to reverse the string alphabets 2.4 WAP to demonstrate use of parameter passing. 2.5 WAP to demonstarate use of Numpy 2.6 WAP to demonstatre the use of Matrix .	2.5 format strings 2.6 join, function creation and call 2.7 passing parameters 2.8 File Handling in python 2.9 Regular Expression 2.10 Introduction to NumPy 2.11 arrays, matrix 2.12 operations on arrays and matrix	

SW-2 Suggested Sessional Work (SW):

Assignments:

a. Write a Python **Program** to find the length of string
b. Write a Python **Program** to reverse the string alphabets
c. Write a Python **Program** to search an alphabet in the string
d. Write a Python **Program** to concatenate two strings
e. Write a Python **Program** to compare two strings
f. Write a Python **Program** to find a substring in the string
g. Write a python script to concatenate 2Strings.
h. Write a Python script to find all the vowels in the given string

Write a Python **Program** to reverse the order of the items in the array

01CA212**.3: Make use of sequences and standard libraries in Programming**

Approximate Hours

Item	AppXHrs
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO3.1 To know List and their processing **SO3.2**To Understand the Built in functions in Python. **SO3.3** To learn about Dictionary and their operations **SO3.4** To Learn About tuples	3.1Write a Python Program to find a substring in the string 3.2Write a python script to concatenate 2 Strings. 3.3 Write a Python script to find all the vowels in the given string 3.4 WAP to demonstrate the use of list. 3.5 WAP to create dictionary. 3.6 WAP to Delete dictionary.	**Unit 3: Lists, Tuples and Dictionaries:** 3.1 Introduction to Lists. 3.2 List Creation, Processing List 3.3 Finding Items in Lists with the in Operator 3.4 built-in function 3.5 Copying Lists, 3.6 Introduction to Tuples, 3.7 Converting Between Lists and Tuples 3.8 Introduction to Dictionaries, 3.9 creating a Dictionary 3.10 Processing Dictionaries 3.11 Adding, modification 3.12 deletion dictionary elements using dictionary methods	i. About List ii. About functions

SW-3 Suggested Sessional Work (SW):

Assignments:

a. Write a Python **Program** to sum all the items in a list.
b. Write a Python **Program** to get the largest number from a list.
c. Write a Python **Program** to remove duplicates from a list.
d. Write a Python **Program** access the index of a list.
e. Write a Python **Program** to create a tuple with numbers and print.
f. Write a Python **Program** to add an item in a tuple.
g. Write a Python script to sort (ascending and descending) a dictionary by value
h. Write a Python script to merge two Python dictionaries

01CA212**.4: Make use of sequences and standard libraries in Programming**

Approximate Hours

Item	Apprx. Hrs.
CI	13
LI	12
SW	1
SL	1
Total	27

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO4.1 Understanding Class and object. **SO4.2**Understanding the Attribute and methods **SO4.3**Understanding the Scopes and namespaces **SO4.4** Understand the data Hiding, inheritance, overloading, overriding **SO4.**5 To Know about Exception handling	4.1 Write a Python Program to get the largest number from a list. 4.2 Write a Python Program to remove duplicates from a list. 4.3Write a Python Program access the index of a list. (Ascending and descending) a dictionary by value 4.4WAP to Create class in python. 4.5 WAP to create Scopes and name space . 4.6WAP to demonstrate Exception Handling.	**Unit-4:** Classes and Object-Oriented Programming 4.1 Class 4.2 Object, 4.3 Attributes 4.4 Methods. 4.5 Scopes and Namespaces, 4.6 Data hiding. 4.7 Inheritance 4.8 Overloading 4.9 Overriding 4.10 Exception Handling 4.11 except clause, 4.12 try finally clause 4.13 ser Define Exceptions.	i. About class, object and attribute ii. About. data Hiding, inheritance, overloading, overriding

SW-4 Suggested Sessional Work (SW):

Assignments:

Write a **Class** for student having the following attributes name, roll no, address, course. Also write the access or methods for all of the fields

01CA212.5**: Application development in python programming**

Approximate Hours

Item	AppXHrs

Cl	09
LI	12
SW	1
SL	1
Total	23

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO5.1 understand the Django framework **SO5.2**to know about creating a new project **SO5.3**. Overview of Django model. **SO5.4** to know about querying models & connecting to MySQL database **SO5.5** To know about Django CRUD	5.1. Write a Python script to merge two Python Dictionaries. 5.2Write a python script to print the last element of the given string 5.3Write a Class for student Having the following attributes name, roll no, address, course. Also write the access or methods for all of the fields. 5.4 Single page web development using Django 5.5Resoponsive form and edsign using Django. 5.6 Real time chat application using Django.	**Unit 5: Python frameworks** 5.1 Django framework 5.2 Django dependencies 5.3 creating a new project 5.4. starting new project, 5.5 creating static home page 5.6 Django models 5.7 model relationships 5.8 querying models & connecting to MySQL database 5.9 Django CRUD .	1. about Django framework 2. about creating new project 3. about querying models & connecting to MySQL database

SW-5 Suggested Sessional Work(SW):

Assignments:

a) Write a simple Django server that outputs hello world.
b) Write a Django server which emits a simple webpage.
c) Write a Django CRUD based application

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instruction (LI)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+S)

ES-104**.1:** Write simple Python Program using common data structures	14	12	1	1	28
ES-104**.2:** Use files for data input and output	12	12	1	1	26
ES-104.3: Make use of sequences and standard libraries in Programming	12	12	1	1	26
ES-104.4: Apply object Oriented Programming Concepts in problem solving.	13	12	1	1	27
ES-104.5: Application development in python programming	9	12	1	1	23
Total Hours	**60**	**60**	**5**	**5**	**130**

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	: Programming Concepts and Python Basics	03	01	01	05
CO-2	Strings, Function and File Handling	02	06	02	10
CO-3	Lists, Tuples and Dictionaries	03	07	05	15
CO-4	Classes and Object-Oriented Programming	-	10	05	15
CO-5	Python frameworks	03	02	-	05
Total		**11**	**26**	**13**	**50**

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Problem Solving using Python Programming will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method

4. Group Discussion
5. Role Play
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
8. Brainstorming

Text Books/Suggested References:

S. No.	Title	Author	Publisher	Edition &Year
1	Starting out with Python	Gaddis Tony	Pearson,	2018, 4th Edition
2	Learn Web Development with python	Romano Fabrizio, Hiller, Casey C, Ravichandran, Anu	Packet Publishing,	2018.
3	Fluent Python: Clear, Concise, and Effective Programming	Ramalho Luciano	Orilley	2015 1st Edition

Department of Computer Application and Science & Technology
Curriculum of B.Sc. (IT) [Program
(Revised as on 01 August 2023)

Curriculum Development Team

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3. Ms. Shruti Gupta, Assistant Professor, Department of Computer Science and Engineering.
4. Ms. Pragya Shrivastava, Assistant Professor, Department of Computer Science and Engineering.
5. Mr. Anurag Tiwari, Assistant Professor, Department of Computer Science and Engineering.
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7. Dr. Pinki Sharma, Assistant Professor, Department of Computer Science and Engineering.
8. Ms. Pushpa Kushwaha, Assistant Professor, Department of Computer Science and Engineering

COs, POs and PSOs Mapping

Program: B.Sc. IT Course
Code: 01CA212
Course Title: Problem Solving using Python Programming

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Sustainability Engineers and society	Environment and	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO1: Write simple Python Program using Common data structures	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO 2 : Use files for data input and output	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3
CO 3: Make use of sequences and standard libraries in Programming	2	2	1	1	1	2	2	2	1	2	1	2	1	1	2	2	2
CO 4: Apply object Oriented Programming concepts in	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2	2
CO 5 Application development in python programming	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom	**Self-Learning(SL)**
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO 1:** Write simple Python Program using common data structures	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	1.1 1.2 1.3	Unit 1: Programming and Python Basics: 1.1,1.2,1.3,1.4,1.5 1.8,1.9,1.10,1.11,1	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO 2 :** Use files for data input and output	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5	2.1 2.2 2.3	Unit-2 String Han 2.1, 2.2, 2.3, 2.4, 2 2.7,2.8,2.9, 2.10,2	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO 3:** Make use of sequences and standard libraries in Programming	SO3.1 SO3.2 SO3.3 SO3.4	3.1 3.2 3.3	Unit 3: Lists, Tupl Dictionaries: 3.1,3.2,3.3,3.4,3.5 3.10,3.11,3.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO 4:** Apply object Oriented Programming concepts in problem solving.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5	4.1 4.2 4.3	Unit-4: Classes an Programming: 4.1, 4.2, 4.3,4.4,4. 4.10, 4.11,4.12,4.1	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO 5** Application development in python programming	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5	5.1 5.2 5.3	Unit 5: Python fra 5.1,5.2,5.3,5.4,5.5,	

A K S University

Faculty of Computer Application and Science & Technology

Department of Computer Application and Science & Technology

Curriculum of B.Sc. (IT) [Program

(Revised as on 01 August 2023)

Semester-II

Course Code: **02CA221**

Course Title: Operating System

Pre-requisite: Student should have a basic understanding of Fundamental of Computer.

Rationale: Study of Operating System helps students to learn the importance of Computer system resources and the role of operating system in their management policies and algorithms as well as the evolution of Operating Systems. Students will understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks, memory management and file management.

Course Outcomes:

02CA221.1:	Specify objectives of modern operating systems and describe how operating systems have evolved over time.
02CA221.2:	Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks. Also identify the best suited process management technique for any process.
02CA221.3:	Understand the concepts of memory management techniques and file management.
02CA221.4:	Understand the concepts of disk management. Understand and identify potential threats to Operating systems and the security features to guard against them.
02CA221.5:	Understand and operate the Linux system as well as the contribution of Indians in the field.

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Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Minor	02CA221	Operating System	4	4	1	1	10	6

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e., Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini projected.),
SL: Self-Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback teachers ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+ CAT+AT)		
Minor	02CA221	Operating System	15	20	5	5	5	50	50	100

Practical

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)		
			Progressive Assessment (PRA)	End Semester Assessment	Total Marks (PRA+

			Class/Home Assignment 5 number 3 marks each (CA)	Viva1 (5)	Viva2 (5) (SA)	Class Attendance (AT)	Total Marks (CA+CT+SA+ CAT+AT)		
Major	20CA221	Operating system	35	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

02CA221.**1: Specify objectives of modern operating systems and describe how operating systems have evolved over time.**

Approximate Hours

Item	Appx. Hrs.
CI	13
LI	12
SW	1
SL	1
Total	**27**

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

O1.1 Understand Operating System **SO1.2** Understand basic functions of Operating System **SO1.3** Resource Abstraction. **SO1.4** Understand Batch Systems, Multi-Programming Systems. **SO1.5** Understand Multiprocessing Systems, Time Sharing Systems **SO1.6** Understand Distributed OS, Real time systems **SO1.7** Learn about Operating System for Personal Computers. **SO1.8** Learn about Operating System for Workstations. **SO1.9** Learn about Operating System for Hand-held Devices. **SO1.10** Understand use of Operating System in real world. **SO1.11** Learn about commonly used	1. How to install Linux. 2. Linux Directory Commands: pwd, mkdir, rm -rf, ls, cd,cd /,cd~ 3. Linux File Commands: touch, cat, cal > Commands, cat >>, rm, cp, 4. Commands mv, rename 5. Basics of the Linux permissions.	**Unit-1.0 Introduction** 1.1 Introduction to Operating System: What is Operating System? History and Evolution of OS. 1.2 Basic OS functions 1.3 Resource Abstraction. 1.4 Types of Operating Systems— Batch Systems, Multi-Programming Systems. 1.5 Types of Operating Systems— Multiprocessing Systems, Time Sharing Systems 1.6 Types of Operating Systems— Distributed OS, Real time systems. 1.7 Operating System for Personal Computers 1.8 Operating System for Workstations 1.9 Operating System for Hand-held Devices. 1.10 Applications of various operating	1. Learn Basics of Computer Fundamental.
Operating systems - Windows, MacOS. **SO1.12** Learn about commonly used Operating systems - UNIX/Linux **SO1.13** Learn about commonly used Operating systems -		system in real world. 1.11 Some prevalent operating systems — Windows, MacOS 1.12 Some prevalent operating systems — UNIX/Linux. 1.13 Some prevalent operating systems —	
Android, IOS, Blackberry OS, Symbian, Bada etc.		Android, IOS, Blackberry OS, Symbian, Bada etc.	

SW-1 Suggested Sessional Work (SW):

i. Assignments:

1. What is an Operating System? Describe its functions.

2. Write short notes on Types of Operating Systems— Batch Systems, Multi-Programming Systems, Multiprocessing Systems, Time Sharing Systems, Distributed OS, Real time systems.

j. Mini Project:
NA

k. Other Activities (Specify):
NA

02CA221**.2: Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks. Also identify the best suited process management technique for any process.**

Approximate Hours

Item	Appx. Hrs.
CI	13
LI	12
SW	1
SL	1
Total	27

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
O2.1 Understand the basic concepts of Processes. **SO2.2** Understand Process States and Process Control Block **SO2.3** Understand scheduling, it's types and it's need. **SO2.4** Understand FCFS Scheduling Algorithm. **SO2.5** Understand SJF Scheduling Algorithm. **SO2.6** Understand SRTN Scheduling Algorithm. **SO2.7** Understand RR Scheduling Algorithm. **SO2.8** Understand Priority-based Scheduling Algorithm. **SO2.9** Learn Multiple-Processor, Real-Time. **SO2.10** Learn Multilevel Queue and Multilevel Feedback Queue Scheduling. **SO2.11** Understand basic Concepts of Deadlock.	Linux Permission Commands: su, id, useradd, passwd, 2. Linux Permission Commands: groupadd, 3. chmod, groupdel, chown, chgrp 4. Linux File Content Commands: head, tail, tac 5. Commands ,more, less, 6. WAP to implement FCFS scheduling.	**Unit-2.0 Process Management** 2.1 Process concepts 2.2 Process States and Process Control Block 2.3 Process Scheduling (Preemptive and Non-preemptive) 2.4 FCFS Scheduling Algorithm 2.5 SJF Scheduling Algorithm 2.6 SRTN Scheduling Algorithm 2.7 RR Scheduling Algorithm 2.8 Priority-based Scheduling Algorithm 2.9 Multiple-Processor, Real-Time 2.10 Multilevel Queue and Multilevel Feedback Queue	1. Practice Various scheduling algorithm numerical.

SO2.12 Learn Prevention, and Avoidance of Deadlock. **SO2.13** Learn Detection and recovery from Deadlock.		Scheduling 11 Introduction of Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock. 2.12 Deadlock Handling Approaches: Prevention, Avoidance. 2.13 Deadlock Handling Approaches: Detection and recovery.	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Draw and describe the Process Control Block
2. What is a deadlock? Elaborate the techniques to prevent and avoid a deadlock.

b. Mini Project:

NA

c. Other Activities (Specify):

NA

02CA221**.3: Understand the concepts of memory management techniques and file management.**

Approximate Hours

Item	Appx. Hrs.
CI	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO3.1 Introduction to Memory Management. **SO3.2** Address Binding, Logical versus Physical Address space. **SO3.3** Swapping, Contiguous & Non-Contiguous Allocation.	1.Linux Filter Commands: grep, cat, cut, grep 2. Linux Filter Commands: comm, sed, tee, tr, uniq, wc,od, sort, diff. 3. Linux Utility Commands: find, bc, locate, date, cal, 4. WAP to demonstrate paging	**Unit-3.0 Memory Management** 3.1 Memory Management: Introduction 3.2 Address Binding, Logical versus Physical Address space 3.3 Swapping, Contiguous & Non-Contiguous Allocation 3.4 Fragmentation (Internal & External), Compaction	1.Study various memory allocate on technique use.

SO3.4 Fragmentation (Internal & External), Compaction. **SO3.5** Paging, Segmentation, Virtual Memory. **SO3.6** Demand Paging, Performance of Demand Paging. **SO3.7** Page Replacement Algorithms. **SO3.8** File Management: Concept of File System (File Attributes, Operations, Types).	5. WAP to demonstrate Segmentation. 6. WAP to demonstrate Page replacement algorithms.	3.5 Paging, Segmentation, Virtual Memory 3.6 Demand Paging, Performance of Demand Paging 3.7 Page Replacement Algorithms 3.8 File Management: Concept of File System (File Attributes, Operations, Types) 3.9 Functions of File System, Types of File System 3.10 Access Methods (Sequential, Direct & other methods) 3.11 Directory Structure (Single-Level, Two-Level,	
SO3.9 Functions of File System, Types of File System. **SO3.10** Access Methods (Sequential, Direct & other methods). **SO3.11** Directory Structure (Single-Level, Two-Level, Tree-Structured, Acyclic-Graph, General Graph). **SO3.12** Allocation Methods (Contiguous, Linked, Indexed).		Tree-Structured, Acyclic-Graph, General Graph) 3.12 Allocation Methods (Contiguous, Linked, Indexed)	

SW-3 Suggested Sessional Work (SW):

h. Assignments:

1. Write short notes on Page replacement algorithms.
2. Differentiate between fragmentation and segmentation.

i. Mini Project: NA

j. Other Activities (Specify):NA

02CA221.**4: Understand the concepts of disk management. Understand and identify potential threats to Operating systems and the security features to guard against them.**

Approximate Hours

Item	Appx. Hrs.

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CI	11
LI	12
SW	2
SL	2
Total	15

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO4.1 Introduction to Disk Management. **SO4.2** Disk Scheduling Algorithms - FCFS. **SO4.3** Disk Scheduling Algorithms - SSTF. **SO4.4** Disk Scheduling Algorithms – SCAN. **SO4.5** Disk Scheduling Algorithms – C-SCAN. **SO4.6** Disk Scheduling Algorithms - LOOK. **SO4.7** Understand Swap Space Management, Disk Reliability, Recovery. **SO4.8** Learn Security Threats, Security policy mechanism. **SO4.9** Learn about Protection, Trusted System. **SO4.10** Learn about Authentication and Internal Access Authorization. **SO4.11** Learn about Windows Security.	4.1 Linux Utility Commands: sleep, time,df, mount, 4.2 Linux Utility Commands: exit, clear,gzip, gunzip. 4.3 Linux Networking Commands: ip, ssh, mail,ping, host 4.4 Wap of SCAN algorithm. 4.5 WAP of SSTF 4.6 WAP of LOOK	**Unit-4.0 Disk Management** 4.1 Disk Management: Structure 4.2 Disk Scheduling Algorithms - FCFS 4.3 Disk Scheduling Algorithms - SSTF 4.4 Disk Scheduling Algorithms – SCAN 4.5 Disk Scheduling Algorithms – C-SCAN 4.6 Disk Scheduling Algorithms - LOOK 4.7 Swap Space Management, Disk Reliability, Recovery 4.8 Security Threats, Security policy mechanism 4.9 Protection, Trusted System 4.10 Authentication and Internal Access Authorization. 4.11 Windows Security	1. Go through various Disk scheduling algorithms.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Write short notes on various Disk scheduling algorithms
2. Differentiate between Authentication and Authorization. Also, describe security threats and what should be the Security Policy mechanism.

b. Mini Project:

NA

c. Other Activities (Specify):

NA.

02CA221.5: Understand and operate the Linux system as well as the contribution of Indians in the field.

Approximate Hour

Item	Appx. Hrs.
CI	11
LI	00
SW	2
SL	2
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
O5.1 Introduction to LINUX. **SO5.2** It's features and Advantages. **SO5.3** Linux architecture. **SO5.4** Learn about Linux file System. **SO5.5** Learn about Linux Directories and kernel. **SO5.6** Learn partitioning, installation and basic Linux commands. **SO5.7** Learn about Linux processes and disk Management. **SO5.8** Comparison between Linux and various other operating systems Available in the market. **SO5.9** Understand the importance of Linux Kernel, Files and Directories.	5.1 Edit Crontab file: to wall message on system on particular time automatically. 5.2Vi editor: Create file, edit,save and quit. 5.3Vi editor: Highligting the searched term within a file. cut, yank,undo. 5.4 WAP to demonstrate init and run. 5.5 WAP to demonstrate fdisk.	**Unit-5.0 Linux** 5.1 LINUX: Introduction, History. 5.2 Features of Linux, advantages 5.3 Hardware requirements for installation, Linux architecture 5.4 File system of Linux - boot block, super block, inode table, data blocks 5.5 Linux standard directories, Linux kernel 5.6 Partitioning the hard drive for Linux, installing the Linux system, system - startup and shut-down process, init and run levels 5.7 Process, Swap, Partition, fdisk, checking disk free spaces. 8 Difference between CLIOS	1. Learn Linux Commands.

SO5.10 Understand the concept Of Open source Software. **SO5.11** Learn about the Contributions of Indians.	5.6 Partitioning the Linux kernel	& GUI OS, Windows v/s Linux. 5.9 Importance of Linux Kernel, Files and Directories. 5.10 Concept of Open-Source Software 5.11 Indian contribution to the field — the BOSS operating system, open source software's, growth of LINUX, Arya Bhatt Linux, contributions of innovators — Rajen Sheth, Sunder Pichai etc.	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Write the difference between CLI OS and GUI OS.
2. Describe LINUX Architecture.

b. Mini Project:

NA

c. Other Activities (Specify):

NA.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	LI (Laboratory Instruction)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
02CA221.1**:** At the end of this chapter the student will be able to specify objectives of modern operating systems and describe How operating systems have evolved over time.	13	12	1	2	16

02CA221.2: At the end of this chapter the student will understand various process management concepts and can compare various scheduling techniques, synchronization, and	13	12	2	4	19
Deadlocks. Also identify the best suited process management technique For any process.					
02CA221.3: At the end of this chapter the student will understand the concepts of memory Management techniques and file management.	12	12	2	2	16
02CA221.4: At the End of this chapter the student will understand the concepts of disk management. Understand and identify potential threats to Operating systems and the security features to guard against Them.	11	12	2	2	15
02CA221.5: At the end of this chapter the student will understand and operate the Linux system as well as the contribution of Indians in The field.	11	12	2	2	15
Total Hours	60	60	9	12	81

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	

02CA221.1	Introduction	02	05	01	08
02CA221.2	Process Management	02	03	05	10
02CA221.3	Memory Management	02	03	07	12
02CA221.4	Disk Management	1	3	7	10
S1-BCAB2T.5	LINUX	1	05	05	10
Total		**13**	**26**	**13**	**50**

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Operating System will be held with written examination of 50 marks.

Suggested Learning Resources:

a. Books:

S. No.	Title	Author	Publisher	Edition &Year
1	Operating Systems: A Modern Perspective	G. Nutt	2nd Edition Pearson Education	
2	Operating Systems, Internals & Design Principles	W. Stallings	8th Edition, Pearson Education	
3	Operating Systems-Concepts and design	M. Milenkovic	Tata McGraw Hill	
4	Operating Systems Concepts	A Silberscliatz, P.B. Galvin, G. Gagne	8th Edition, John Wiley Publications	
5	Modem Operating Systems, 3rd Edition	A.S. Tanenbaum	Pearson Education.	

Curriculum Development Team

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15. Dr. Pinki Sharma, Assistant Professor, Department of Computer Science and Engineering.

16. Ms. Pushpa Kushwaha, Assistant Professor, Department of Computer Science and Engineering.
17. Mr. Prasoon Thakur, Teaching Associate, Department of Computer Science and Engineering.

COs, POs and PSOs Mapping

Program: B.Sc.(IT)

Course Code: 02CA221

Course Title: Operating System

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer- based systems of various complexity	Utilize relevant methods and cutting- edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	pplying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1: Specify objectives of modern operating systems and describe how operating systems have evolved over time.	2	2	3	3	3	1	1	3	1	1	1	3	2	3	3	1	2
CO 2: Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks. Also identify the best suited process management technique for any process.	1	3	2	3	2	2	2	2	1	1	1	3	2	2	2	1	3
CO3: Understand the concepts of memory management techniques and file management.	2	2	2	3	3	2	1	2	1	1	1	3	1	1	2	2	2
CO 4: Understand the concepts of disk management. Understand and identify potential threats to Operating systems and the security features to guard against them.	1	2	3	2	3	2	1	3	1	2	1	3	3	3	3	2	2
CO 5: Understand and operate the Linux system as well as the contribution of Indians in the field.	1	2	2	2	3	2	1	3	1	1	1	3	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: Specify objectives of modern operating systems and describe how operating systems have evolved over time.	SO1.1, SO1.2, SO1.3, SO1.4, SO1.5, SO1.6, SO1.7, SO1.8, SO1.9, SO1.10, SO1.11, SO1.12, SO1.13		Unit-1 Introduction 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9,1.10,1.11,1.12,1.13	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks. Also identify the best suited process management technique for any process.	SO2.1, SO2.2, SO2.3, SO2.4, SO2.5, SO2.6, SO2.7, SO2.8, SO2.9, SO2.10, SO2.11, SO2.12, SO2.13		Unit-2 Process Management 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9,2.10,2.11, 2.12,2.13	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3: Understand the concepts of memory management techniques and file management.	SO3.1, SO3.2, SO3.3, SO3.4, SO3.5, SO3.6, SO3.7, SO3.8, SO3.9, SO3.10, SO3.11, SO3.12		Unit-3 Memory Management 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,3.10,3.11,3.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 4: Understand the concepts of disk management. Understand and identify potential threats to Operating systems and the security features to guard against them.	SO4.1, SO4.2, SO4.3, SO4.4, SO4.5, SO4.6, SO4.7, SO4.8, SO4.9, SO4.10, SO4.11		Unit-4 Disk Management 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 5: Understand and operate the Linux system as well as the contribution of Indians in the field.	SO5.1, SO5.2, SO5.3, SO5.4, SO5.5, SO5.6, SO5.7, SO5.8, SO5.9, SO5.10, SO5.11		Unit-5 LINUX 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10,5.11	

A K S University

Faculty of Computer Application and Science & Technology

Department of Computer Application and Science & Technology

Curriculum of B.Sc. (IT) [Program

(Revised as on 01 August 2023)

Semester-II

Course Code: 03CA231

Course Title: Digital Marketing

Pre-requisite: Basic understanding of marketing principles and online communication.

Rationale: This syllabus equips students with essential skills for navigating the contemporary business landscape, focusing on online strategies, social media, and analytics to drive effective marketing campaigns in the digital age.

Course Outcomes: After successful completion of the course, the student will be able to:

03CA231.1 Understand digital marketing, importance thereof, meaning of web site and levels of web site, difference between blog, portal & website.

03CA231.2 Understand the working of SEO (search engine optimization) on page optimization, off page optimization, and will learn of prepare reports

03CA231.3 Learn about SMO (social media optimization) like Facebook, twitter, LinkedIn, Tumblr, Pinterest and other social media servicer's optimization.

03CA231.4 Under paid tools like Google ad words, dispel.

03CA231.5 Assess the success of online marketing campaigns based on key performance indicators.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Open Elective	03CA231	**Digital Marketing**	4	0	2	1	7	4

Legend: **CI**: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW &SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

A K S University

Faculty of Computer Application and Science & Technology

Department of Computer Application and Science & Technology

Curriculum of B.Sc. (IT) [Program

(Revised as on 01 August 2023)

Scheme of Assessment:

Theory

Board of Study	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA + ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA +CAT+AT)		
PCC	03CA231	Digital Marketing	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

03CA231.1: Understand digital marketing, importance thereof, meaning of web site and levels of web site, difference between blog, portal & website.

Approximate Hours

Item	Appx. Hrs.
Cl	9
LI	2
SW	2
SL	1
Total	14

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

O1.1 Define digital marketing, distinguishing it from traditional methods. **SO1.2** Compare return on investments in digital marketing with traditional approaches. **SO1.3** Identify and utilize tools for successful digital marketing campaigns. **SO1.4** Assess the significance and differences among blogs, websites, and portals. **SO1.**5 Measure performance using conversion rates and retention metrics in digital marketing. .	1. Devise a step-by-step plan to improve the page rank of our university website through effective Search Engine Optimization (SEO) Techniques. 2. Utilize Google Analytics to monitor and analyze website traffic for our University's online platform. Provide insights and recommend ations based on the data.	**Unit-1.0** Introduction to Digital Marketing: 1.1 Meaning of Digital Marketing, Differences from Traditional Marketing 1.2 Return of Investments on Digital Marketing vs. Traditional Marketing 1.3 E Commerce 1.4 Tools used for successful marketing 1.5 SWOT Analysis of Business for Digital Marketing 1.6 Meaning of Blogs 1.7 Websites, Portal and Their Differences, Visibility, 1.8 Visitor Engagement, Conversion Process, Retention, Performance Evaluation. 1.9 Keywords: Titles, Meta Tags.	1. Critically Analyze and compare the distinctions between Digital Marketing and Traditional Marketing, demonstrating understanding through a written reflection.

SW-1Suggested Sessional Work (SW):

a. **Assignments**:
   1. Evaluate the Return on Investments (ROI) in Digital Marketing versus Traditional Marketing using SWOT analysis, fostering analytical skills and application of concepts.

b. **Mini Project**:
   1. Develop a comprehensive digital marketing strategy for an E-commerce business, incorporating tools for successful marketing and emphasizing creative problem-solving and application of knowledge.

c. **Other Activities** (Specify):
   1. Demonstrate knowledge application by optimizing a website's visibility through Titles and Meta Tags, showcasing practical implementation and understanding of SEO principles.

03CA231.2: Understand the working of SEO (search engine optimization) on page optimization, off page optimization, and will learn of prepare reports**.**

Approximate Hours

Item	Appx. Hrs.
Cl	10
LI	2
SW	2
SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO1.1 Implement on-page and off-page SEO techniques for website optimization. **SO1.2** Evaluate the effectiveness of SEO strategies by preparing reports on website performance. **SO1.3** Develop search Campaigns to enhance online visibility and reach target audiences. **SO1.4** Construct display campaigns to effectively showcase products or services online. **SO1.5** Demonstrate a Comprehensive understanding of SEO principles through practical application in engineering projects.	1. Explain how the process of search engine submission contributes to Enhancing the online recognition and visibility of a website, using our college website as an example. 2. Create a detailed plan for designing and optimizing a blog section on the college website, incorporating SEO best practices.	**Unit-2.0** Search Engine Optimization 1.1 Search Engine Optimization (SEO) 1.2 On-Page SEO 1.3 On page Optimization Techniques 1.4 Off-Page SEO 1.5 Off pages Optimization Techniques 1.6 Preparing Reports 1.7 Creating Search Campaigns 1.8 Creating Display Campaigns 1.9 Choose a budget and bidding strategy 1.10 Create responsive display ads	1. Explore on-page optimization principles and strategies in SEO, emphasizing keyword research, meta tags, and content optimization.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Conduct an in-depth analysis of off-page optimization methods, including backlink building, social media signals, and influencer outreach, and present findings in a comprehensive report.

b. Mini Project:

1. Develop and execute a real-world search engine optimization campaign, integrating both on-page and off-page techniques to enhance the online visibility of a chosen website.

c. Other Activities (Specify):

1. Engage in hands-on experience by creating and managing search campaigns, focusing on ad copy creation, bid management, and performance tracking.

03CA231.3: Learn about SMO (social media optimization) like Facebook, twitter, LinkedIn, Tumblr, Pinterest

and other social media servicer's optimization.

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	2
SW	2
SL	1
Total	17

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO3.1 Gain foundational knowledge of Social Media Optimization (SMO) concepts and its relevance in engineering. **SO3.**2. Implement advanced marketing techniques on Facebook, integrating learned principles into practical scenarios. **SO3.**3. Demonstrate competence in blog creation on WordPress, applying acquired skills in content management. **SO3.**4. Implement successful marketing strategies on Twitter and LinkedIn, showcasing proficiency in platform-specific promotional tactics. **SO3.**5. Evaluate social media performance using analytical tools for platforms such as Google Analytics, emphasizing data-driven decision- making in SMO practices.	1. Demonstrate the strategic use of Cross- linking within the college website to improve user navigation and enhance overall SEO. 2. Develop a comprehensive on-page and off- page optimization strategy For the college website, highlighting key areas for improvement.	**Unit-3:** Social Media Optimization (SMO): 3.1. Introduction to Social Media Optimization (SMO) 3.2. Introduction to Social Media Marketing 3.3. Advanced Facebook Marketing 3.4. Word press Blog Creation 3.5. Twitter Marketing 3.6. LinkedIn Marketing 3.7. Instagram Marketing, 3.8. Social media Analytical Tools 3.9. Keywords: Google, Word press, FB, LinkedIn, Instagram, Analytics, SMO 3.10. Verbal Communication 3.11. Non- Verbal Communication 3.12. Intra personal and Interpersonal communication.	1. Explore key concepts in Social Media Optimization (SMO) Including Advanced Facebook Marketing, WordPress Blog Creation, Twitter Marketing, LinkedIn Marketing, and Instagram Marketing.

SW-3 Suggested Sessional Work (SW):

a) **Assignments**:
1. Analyze the impact of SMO strategies on various social media platforms (Google, WordPress, FB, LinkedIn, and Instagram) and present findings using analytical tools.

b) Mini Project:
1. Develop a comprehensive Social Media Marketing plan integrating verbal and non-verbal communication strategies for a chosen engineering-related topic.

c) Other Activities (Specify):

1. Participate in intra-personal and interpersonal communication workshops to enhance communication skills relevant to SMO, fostering collaboration and effective engagement in the digital landscape.

03CA231.4: Under paid tools like Google ad words, dispel.

Approximate Hours

Item	App XHrs
Cl	14
LI	2
SW	2
SL	1
Total	19

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Recall the meaning and purpose of Search Engine Marketing. **SO4.**2. Distinguish and comprehend the tools used in SEM, such as Pay Per Click, Google Adwords, and Display Advertising Techniques. **SO4.**3. Analyze website traffic using SEM techniques for effective online visibility and user engagement. **SO4.**4. Apply knowledge to generate reports in SEM, showcasing practical skills in monitoring and evaluating online marketing campaigns. **SO4.**5. Critically assess the effectiveness of display advertising techniques within the context of SEM for targeted audience engagement.	1. Design a backlink strategy to improve the University website's authority, and outline the importance and implementation of Outbound links for a well-rounded online presence. 2. Integrate web developmentt principles with audio- video production techniques to enhance the multimedia aspects of the college Website.	**Unit-4:**Search Engine Marketing**:** 4.1 Introduction to Search Engine Marketing 4.2 Meaning of Search Engine Marketing 4.3 Use of Search Engine Marketing 4.4 Tools used SEM 4.5 Pay Per Click 4.6 Google Adwords 4.7 Display Advertising Techniques 4.8 Report Generation 4.9 Website Traffic Analysis 4.10 Engage in hands-on Website Traffic Analysis 4.11 Utilizing tools 4.12 Collect data 4.13 Google Analytics to interpret data 4.14 Optimize marketing strategies.	1. Explore Foundational concepts of Search Engine Marketing (SEM) through online resources and industry blogs.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Analyze a real-world case study, implementing Pay Per Click (PPC) and Google Adwords to develop a comprehensive SEM strategy.

b. Mini Project:

1. Design and execute a Display Advertising campaign using industry-relevant techniques, emphasizing creativity and impact assessment.

c. Other Activities (Specify):

1. Engage in hands-on Website Traffic Analysis, utilizing tools like Google Analytics to interpret data and optimize marketing strategies.

03CA231.5: Assess the success of online marketing campaigns based on key performance indicators.

Approximate Hours

Item	Appx. Hrs.
Cl	15
LI	2
SW	2
SL	1
Total	20

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO5.1. Apply Google Analytics for Performance Analysis in Affiliate Marketing and Ad Designing. **SO5.**2. Evaluate Online Reputation Management Strategies for Effective Digital Advertising. **SO5.**3. Implement E-Mail Marketing Techniques to Enhance Communication in Affiliate Marketing. **SO5.**4. Analyze Ad Words Algorithm to Optimize Pay-Per-Click (PPC) Campaigns. **SO5.**5. Design Effective Advertisements Considering SEM, Google Analytics, and Social Media.	1. Develop Engaging digital content for a specific section of the college website, focusing on relevance, quality, and alignment with the target audience. 2. Conduct a thorough analysis of product and sales reviews related to the college, leveraging online platforms. Propose strategies for addressing feedback and	**Unit 5:** Basics of affiliate Marketing and Ad Designing**:** 5.1 Introduction to Affiliate Marketing 5.2 Introduction to Ad Designing 5.3 Google Analytics 5.4 Online Reputation Management 5.5 E-Mail Marketing 5.6 Affiliate Marketing 5.7 Understanding Ad Words Algorithm	1. Explore the fundamentals of Affiliate Marketing, Ad Designing, and Online Reputation Management through online resources and case studies.

	improving The online reputation.	5.8 Advertisement Designing. 5.9 Keywords: PPC 5.10Google Adwords 5.11Reports 5.12 SEM 5.13 Google Analytics 5.14 Ad Design 5.15 Social Media, Affiliate	

SW-5 Suggested Sessional Work (SW):

a. **Assignments**:

1. Analyze and implement E-Mail Marketing strategies, incorporating principles of Affiliate Marketing and Ad Designing in a real-world scenario.

b. Mini Project:

1. Develop a comprehensive understanding of Google Analytics, SEM, and Google AdWords Algorithm by executing a mini project focused on optimizing online advertising campaigns.

c. Other Activities (Specify):

1. Engage in hands-on experiences related to PPC, generating reports, and utilizing social media platforms for effective promotion, enhancing practical skills in the digital marketing domain.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessiona l Work (SW)	Self-Learnin g (Sl)	Total hour (Cl+SW+S l)
03CA231.1: Understand digital marketing, importance thereof, meaning of web site and levels of web site, difference between blog, portal & website.	9	2	1	12
03CA231.2: Understand the working of SEC (search engine optimization) on page optimization, off page optimization, and will learn of prepare reports	10	2	1	13
03CA231.3: Learn about SMO (social media optimization) like Facebook, twitter, LinkedIn, Tumblr, Pinterest and other social media servicer's optimization.	12	2	1	15
03CA231.4: Under paid tools like Google ad words, dispel.	14	2	1	17
03CA231.5: Assess the success of online marketing campaigns based on key performance indicators	15	2	1	18
Total Hours	**60**	**10**	**5**	**75**

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO- 1	Introduction to Digital Marketing	03	01	01	05
CO- 2	Search Engine Optimization	02	06	02	10
CO-3	Social Media Optimization (SMO)	03	07	04	14
CO- 4	Search Engine Marketing	-	10	05	15
CO- 5	Basics of affiliate Marketing and Ad Designing	03	02	01	06
Total		**11**	**26**	**13**	**50**

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Digital Marketing will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to IT Industry
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration /Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Alternative NPTEL/SWAYAM Course (if any):

S.No.	NPTEL Course Name	Instructor	Host Institute
1.	Basics of Digital Marketing	Prof. Adrish Banerjee	Devi Ahilya Vishwavidyalaya

Suggested Learning Resources:

(a) Books:

S. No.	Title	Author	Publisher	Edition &Year

1	Digital Marketing For Dummies	Russ Henneberry	For Dummies	2017
2	Marketing 4.0: Moving from Traditional to Digital :	Philip Kotler	Wiley	2017
3	https://onlinecourses.swayam2.ac.in/ugc19_hs26/preview			
4	Lecture note provided by Dept. Of Computer Science and Engineering, AKS University, Satna.			

Curriculum Development Team

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Cos, Pos and PSOs Mapping

Course Title: B.Sc.(IT)
Course Code: 03CA231
Course Title: Digital Marketing

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting- edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	pplying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1: Understand digital marketing, importance thereof, meaning of web site and levels of web site, difference between blog, portal & website.	2	2	3	3	3	1	1	3	1	1	1	3	2	3	3	1	2
CO 2: Understand the working of SEO (search engine optimization) on page optimization, off page optimization, and will learn of prepare reports	1	3	2	3	2	2	2	2	1	1	1	3	2	2	2	1	3
CO3: Learn about SMO (social media optimization) like Facebook, twitter, LinkedIn, Tumblr, Pinterest and other social media servicer's optimization.	2	2	2	3	3	2	1	2	1	1	1	3	1	1	2	2	2
CO 4: Under paid tools like Google ad words, dispel.	1	2	3	2	3	2	1	3	1	2	1	3	3	3	3	2	2
CO 5: Assess the success of online marketing campaigns based on key performance indicators	1	2	2	2	3	2	1	3	1	1	1	3	3	3	1	3	3

Legend:1–Low,2–Medium,3–High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO 1:** Introduction to Digital Marketing	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	1.1 1.2	Unit 1: Devise a step-by-step plan to improve the page rank of our 1.1,1.2,1.3,1.4,1.5,1.6,1.7, 1.8,1.9,1.10,1.11,1.12,1.12,1.14	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO2:**Search Engine Optimization	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5	2.1 2.2	Unit-2 Explain how the process of search engine submission contributes 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9, 2.10,2.11,2.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO 3:** Social Media Optimization (SMO)	SO3.1 SO3.2 SO3.3 SO3.4	3.1 3.2	Unit 3: Demonstrate the strategic use of cross-linking 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9, 3.10,3.11,3.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO 4:**. Search Engine Marketing	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5	4.1 4.2	Unit-4 Design a backlink strategy to improve the University website's 4.1, 4.2, 4.3,4.4,4.5,4.6,4.7,4.8,4.9, 4.10, 4.11,4.12,4.13	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO 5** Basics of affiliate Marketing and Ad Designing	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5	5.1 5.2	Unit 5: Develop engaging digital content for a specific section of the college website, 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9	

AKS University

Faculty of Computer Application and Science & Technology

Department of Computer Application and Science & Technology Curriculum of B.Sc. (IT) [Program

(Revised as on 01 August 2023)

Semester-II

Course Code: **03CA232**

Course Title: Multimedia and Animation

Pre- requisite: Basic knowledge of computers

Rationale: The aim of the course is to introduce to the field of Multimedia with emphasis on its use to solve real world problems for which
Solutions are difficult to express using the traditional algorithmic approach. It explores the essential theory behind methodologies for developing systems that can create new Multimedia technologies like video editing, animation, image editing.

Course Outcomes:

03CA232.1: Demonstrate knowledge of the fundamental principles of multimedia.
03CA232.2: Apply Fonts and image fundamentals. 03CA232.3:
Fundamentals of Audio and Video
03CA232.4: Familiarize knowledge representation in Animation. 03CA232.5:
Comprehend the use of 2D and 3D Animation.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Open Elective	03CA232	Multimedia And Animation	3	0	1	1	5	3

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) And others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Course	Course	Scheme of Assessment (Marks)		
			Progressive Assessment (PRA)	End	Total Marks

		Title	Class/HomeAssignment5 number 3 markseach (CA)	Class Test2 (2 best out of 3) 10 markseach (CT)	Seminar one	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT +AT)	**Semester Assessment (ESA)**	
OE	**03CA 232**	Multimedia And Animation	**15**	**20**	**5**	**5**	**5**	**50**	**50**	**100**

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

03CA231.1: Demonstrate knowledge of the fundamental principles of multimedia.

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**
O1.1 Understand the concept of Multimedia **SO1.2** Compare types of Multimedia. **SO1.3** Apply types of Multimedia in real life. .		**Unit-1.0 Introduction to Multimedia** 1.1 What is multimedia? Multimedia and hypermedia 1.2 Components of multimedia - textual, images, 1.3 graphics, animation, audio, video 1.4 Linear and Non- Linear Multimedia Application of	1. Search devices using Multimedia 2. Apps using Multimedia.

		Multimedia, Requirement of Multimedia System. 1.5 Multimedia Authoring. 1.6 Multimedia Authoring Metaphors, 1.7 Multimedia Production. 1.8 Multimedia Presentation and tools. 1.9 Automatic Authoring. 1.10Editing and Authoring 1.11 Tools. Multimedia Hardware. 1.12 Compression & Decompression	

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Use of authoring tool.
ii. Use of latest Ms. Word
iii. Applications of Multimedia.

03CA231.2: Apply Fonts and image fundamentals.

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)

SO2.1 Understand the Concept of Fonts and Hypertext. **SO2.2** Use the image fundamentals **SO2.3** Demonstrate the use of image editing software.	.	**Unit-2.0 Fonts and Hypertext** **2.1** Usage of text in Multimedia, Families and **2.2** Faces of fonts. Outline fonts. bitmap fonts **2.3** International character sets and hypertext. **2.4** Digital font's techniques. **2.5** Image fundamentals: Image formats, **2.6** Bitmap and Vector **2.7** 2.4. Color Models, Color palettes, 2D Graphics **2.8** image Compression and File Formats: GIF, JPEG, JPEG 2000, **2.9** PNG, TIFF, EXIF, PS. PDF, 2.102.6 Basic image Processing. Use of image editing	1. How Different fonts are used. 2.Apply Different image editing soft wares.
		software 2.11 Photo Retouching. Image resolution. 2.12 Color. Raster and Vector Graphics.	

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Difference between fonts and faces.
ii. Difference between bitmap and raster images.
iii. Apply Photoshop to edit an image.

03CA231.3: Fundamentals of Audio and Video

.

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO3.1 Understand the concept of Audio **SO3.2** Understand the Concept of video. **SO3.3** Apply various audio and video tools.	.	**Module 3: Audio fundamentals: Audio quality, formats and devices,** 3.1. Digitization of sound. frequency and bandwidth, decibel System. 3.2. data rate audio file format, Sound synthesis. 3.3. Musical Instrument 3.4.Digital Interface 3.5.(MIDI), wavetable 3.6.Compression and transmission of audio on 3.7. Internet, Editing and Adding sound to multimedia project, Audio software and hardware. 3.8. **Video Fundamental:** Video basics. Formats. how video works 3.9. Types of video signals - component. Composite and S-video. Analog video, Digital video, 3.10. Broadcast Video Standards (NTSC, PAL), Video Recording and Tape formats. Shooting and editing Video, 3.11. Video compression and File formats (JPEG.MPEG), Video	1. Compare and analyze audio and video editing tools.

		3.12. Software and hardware.	

SW-1 Suggested Session Work (SW):

Assignments:

i. Application of audio software**.**
ii. Application of the video software.
iii. Difference between different video standards.

03CA232.4: Familiarize knowledge representation in Animation.

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**
SO4.1 Understand the concept of Animation. **SO4.2** Use of frames and slots. **SO4.3** Apply animation software.	.	**Unit-4.0 Animation** 4.1. Introduction and definition of animation, Principles 4.2. Types and uses. 4.3. Methods and Techniques of animation, 4.4. Basic animation 4.5. Text and image animation. 4.6. Time line construction and management. 4.7. Masking Motion and shape 4.8. Tweening. Morphing 4.9. , Onion skinning. Animation File 4.10. Formats. Keyframe animation, 4.11. Working with	1. Compare and analyze all animation techniques.

		symbols and 4.12. Animation Software	

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Questions based on frames.
ii. Questions based on motion and shape tween.
iii. Questions based on text and image animation.

03CA232.5: Comprehend the use of 2D and 3D Animation.

Approximate Hours

Item	AppX Hrs
Cl	12
LI	00
SW	02
SL	01
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO5.1 Understand the concept of 2D animation. **SO5.2** Understand the concept of 2D animation.	.	**Unit-5.0 Basics of 2D and 3D animation.** 5.1. Overview of 2D animation and its features, 5.2. Drawing tools. Types of panels. 5.3. transformation, property panel 5.4. Working with objects. group, bitmap 5.5. Controlling Movie clips with code. 5.6. Working with Dynamic Text fields and Input Text Fields. 5.7. Loading external content and other movies. Dynamic preloaders 5.8. Interactivity with code. Difference between 2D and 3D animation 5.9. Tweening and motion along a path,	1. Compare and analyze all 2D and 3D animation techniques.

		5.10. controlling movie playback. 5.11. Text and hyperlink. Adding sound and movie. 5.12. Introduction to 3D animation And its basic concepts, and its applications.	

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Difference between 2D and 3D animation,
ii. Use of tweening.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
03CA231.1: Demonstrate knowledge of the fundamental principles of multimedia	08	02	01	11
03CA231.2: Apply Fonts and image fundamentals.	09	02	01	12
03CA231.3: Fundamentals of Audio and Video	10	02	01	13
03CA231.4: Familiarize knowledge representation in Animation	10	02	01	13
03CA231-5: Comprehend the use of 2D and 3D Animation	08	02	01	11
Total Hours	45	10	5	60

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	**Introduction to Multimedia**	03	02	03	08
CO-2	**Fonts and Hypertext**	03	01	05	09
CO-3	**Audio fundamentals**	03	07	02	12
CO-4	**Animation**	03	05	05	13
CO-5	**Basic 2D and 3D animation**	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Introduction to Computer science will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to software industry
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

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Suggested Learning Resources:

A. Books:

S. No.	Title	Author	Publisher	Edition & Year
1	"Multimedia Making It Works	Tay Vaughan	Tata McGraw-Hill.	9th edition 2008
2	Multimedia Systems	Rajneesh Aggarwal & B. B Tiwari	Excel Publication. New Delh	3rd Edition 2002
3	Lecture note provided by Dept. of CS&E, AKS University, Satna.			

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CO, PO and PSO Mapping

Course Title: B.SC (IT)

Course Code : 03CA232
Course Title: Multimedia and Animation

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting- edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	pplying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1: Specify objectives of modern operating systems and describe how operating systems have evolved over time.	2	2	3	3	3	1	1	3	1	1	1	3	2	3	3	1	2
CO 2: Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks. Also identify the best suited process management technique for any process.	1	3	2	3	2	2	2	2	1	1	1	3	2	2	2	1	3
CO3:Understand the concepts of memory management techniques and file management	2	2	2	3	3	2	1	2	1	1	1	3	1	1	2	2	2
CO 4: Understand the concepts of disk management. Understand and identify potential threats to Operating systems and the security features to guard against them.	1	2	3	2	3	2	1	3	1	2	1	3	3	3	3	2	2
CO 5: Understand and operate the Linux system as well as the contribution of Indians in the field.	1	2	2	2	3	2	1	3	1	1	1	3	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: Specify objectives of modern operating systems and describe how operating systems have evolved over time.	SO1.1, SO1.2, SO1.3, SO1.4, SO1.5, SO1.6, SO1.7, SO1.8, SO1.9, SO1.10, SO1.11, SO1.12, SO1.13		Unit-1 Introduction 1.1,1.2,1.3,1.4,1.5, 1.6,1.7,1.8,1.9,1.10 ,1.11,1.12,1.13	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks. Also identify the best suited process management technique for any process.	SO2.1, SO2.2, SO2.3, SO2.4, SO2.5, SO2.6, SO2.7, SO2.8, SO2.9, SO2.10, SO2.11, SO2.12, SO2.13		Unit-2 Process Management 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9,2.10,2.1 1,2.12,2.13	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3: Understand the concepts of memory management techniques and file management.	SO3.1, SO3.2, SO3.3, SO3.4, SO3.5, SO3.6, SO3.7, SO3.8, SO3.9, SO3.10, SO3.11, SO3.12		Unit-3 Memory Management 3.1,3.2,3.3,3.4,3.5, 3.6,3.7,3.8,3.9,3.10 ,3.11,3.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 4: Understand the concepts of disk management. Understand and identify potential threats to Operating systems and the security features to guard against them.	SO4.1, SO4.2, SO4.3, SO4.4, SO4.5, SO4.6, SO4.7, SO4.8, SO4.9, SO4.10, SO4.11		Unit-4 Disk Management 4.1,4.2,4.3,4.4,4.5,4.6 ,4.7,4.8,4.9,4.10,4.11	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 5: Understand and operate the Linux system as well as the contribution of Indians in the field.	SO5.1, SO5.2, SO5.3, SO5.4, SO5.5, SO5.6, SO5.7, SO5.8, SO5.9, SO5.10, SO5.11		Unit-5 LINUX 5.1,5.2,5.3,5.4,5.5, 5.6,5.7,5.8,5.9,5.10 ,5.11	

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Semester-III

Course Code: 03CA301

Course Title: Data Analytics & Visualization through Spread Sheet

Pre-requisite: Student should have basic knowledge of MS-Excel

Rationale: Data analytics and visualization is important because it helps to process Data sets and creating visual instances.

Course Outcomes:

03CA232.1: Students should be familiar with various characteristics of the spreadsheet.
03CA232.2: Learn how to format spreadsheet, and viewing its appearance before printing.
03CA232.3: Importing/Exporting Access Data and Text Files. Securing worksheet and workbook.
03CA232.4: Calculate values and process data through various formula, and using data validation formula.
03CA232.5: Visualize data values through various types of charts.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Skill Enhancement	03CA301	Data Analytics & Visualization through Spread Sheet	2	0	2	1	5	2

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e., Lecture(L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini projected.),
SL: Self-Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback teachers ensure outcome of Learning.

Scheme of Assessment:

Theory

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Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+ CAT+AT)		
PE	03CA 301	Data Analytics & Visualization through Spread Sheet	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

03CA232.1: Students should be familiar with various characteristics of the spreadsheet.

Approximate Hours

Item	Appx. Hrs.
CI	6
LI	0
SW	2
SL	1
Total	9

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO1.1 Understanding various brands of spreadsheets. **SO1.2** Understanding basic Components of spreadsheet. **SO1.3** Understanding cell modes. **SO1.4** Understanding various data types used in spreadsheet.		**Unit-1.0 Introduction to Spreadsheet** 1.1 Brands and Platforms, Excel, Calc, and Google Sheets, 1.2 User Interface, Ribbon, Quick Access toolbar. 1.3 Workbooks and Worksheets. Opening new file and saving Spreadsheet, Rows, Columns, Cells, 1.4 Fundamentals of rows, Columns and cell and navigation; 1.5 Various modes of selecting cells (shift arrow, ctrl shift arrow, mouse click and drag, mouse click and shift click); 1.6 Merging cells; Selecting rows and columns, Non-contiguous cells; How to enter data (numeric, text, date),	Learning basic features and components of sheets.

SW-1 Suggested Sessional Work (SW):

a. Assignments:
1. Create MS-Excel Sheet and Save it.
2. Show cells merging in sheet.

b. Mini Project:
Creating a sheet having 100 student's data.

c. Other Activities (Specify):
NA

03CA232.2: Learn how to format spreadsheet, and viewing its appearance before printing.

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Approximate Hours

Item	Appx. Hrs.
CI	6
LI	0
SW	2
SL	1
Total	9

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO2.1 Understand printing area and preview of worksheet. **SO2.2** Understand page layout and orientation. **SO2.3** Understand page color and border. **SO2.3** Understand header and footer.		**Unit-2.0 Printing Worksheet** 2.1 Select print area, See print preview, Adjusting margin during print preview. 2.2 Page Formatting: Page layout - Orientation, Size, margins; Watermark, 2.3 Page color, Page borders; 2.4 Inserting headers and footer, Inserting page numbers, 2.5 Date, Path and filename. Viewing: Easy view using freeze panes, Split windows, Layout view 2.6 Saving and Sharing File.	Learning sheet formatting and its preview.

SW-2 Suggested Sessional Work (SW):

a. Assignments:
1. Insert header and footer in sheet
2. Split window into sheet

b. Mini Project:
Create a sheet format it using various possible tools.

c. Other Activities (Specify):
NA

03CA232.3: Importing/Exporting Access Data and Text Files. Securing worksheet and workbook.

Approximate Hours

Item	Appx. Hrs.
CI	6

LI	0
SW	2
SL	1
Total	9

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO3.1 Understanding Importing Access Data. **SO3.2** Understanding XML data format. **SO3.3** Understanding Protection and security properties. **SO3.4** Understanding Microsoft queries.		**Unit-3.0 Import and Export Data** 3.1 Import Access Data, 3.2 Microsoft Query, XML. 3.3 Import/Export Text Files, 3.4 Protecting/Securing using file properties: 3.5 Protect Workbook, Read-only Workbook. 3.6 Protect Sheet, Lock Cells,	Exporting and Importing data and protecting sheets.

SW-3 Suggested Sessional Work (SW):

a. Assignments:
1. Prepare XML file.
2. Protect workbook.

b. Mini Project:
Create Access Database and Import into MS-Excell Sheet.

c. Other Activities (Specify):
NA

03CA232.4: Calculate values and process data through various formula, and using data validation formula.

Approximate Hours

Item	Appx. Hrs.
CI	6
LI	0
SW	2
SL	1
Total	9

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Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Understanding Editing and copying formula. **SO4.2** Understanding cell referencing. **SO4.3** Understanding date rejection and validation. **SO4.4** Understanding Measuremen t standards.		**Unit-4.0 Calculations** 4.1 Entering formula, Editing formula, Copying formula 4.2 Cell references, Paste formula 4.3 Data Validation, Reject Invalid Dates, Prevent Duplicate Entries 4.4 Budget Limit, Product Codes, 4.5 Drop-down List, Dependent Drop-down Lists, 4.6 CM to Inches, KG to GM.	Learning different types of formula and data validation methods.

SW-4 Suggested Sessional Work (SW):

a. Assignments:
1. Write down various steps for copying and pasting formula.
2. Write down various steps for entering and editing formula.

b. Mini Project:
Create a summary on Budget Limit features.

c. Other Activities (Specify):
NA.

03CA232.5: Visualize data values through various types of charts.

Approximate Hours

Item	Appx. Hrs.
CI	6
LI	0
SW	2
SL	1
Total	9

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO5.1 Understanding basics of Chart. **SO5.2** Understanding various types of charts. **SO5.3** Understanding chart Components. **SO5.4** Understanding format and design of chart.		**Unit-5.0 Data Visualization** 5.1 Introduction to charts, Various type of charts (Column, Bar, Pie, Area, XY Scatter, Bubble, Net, Stock, Column & Line) 5.2 3-D Shape (Bar, Cylinder, Cone, Pyramid); 5.3 Chart elements (Title, Subtitle, X-axis, Y- axis, Z-axis, Display grids, Legends, Display data series); 5.4 Creating a Chart, Selecting data series, 5.5 Select chart type, Select chart components 5.6 Labels, background, axes, Format and design.	Creating different Types of charts.

SW-5 Suggested Sessional Work (SW):

a. Assignments:
1. Crete a simple pie chart.
2. Create 3-D shape chart.

b. Mini Project:
Apply various 3-D features into chart.

c. Other Activities (Specify):
NA.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	LI (Laboratory Instruction)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
PE-002.1**:** At the end of this chapter the student will be familiar with various characteristics of the machine learning.	6	0	2	1	9
PE-002.2**:** At the end of this chapter the student will learn how algorithm	6	0	2	1	9
works for data processing and instance Generation.					

PE-002.3: At the end of this chapter the student will create genome sequence by using Machine learning algorithm.	6	0	2	1	9
PE-002.4: At the end of this chapter the student will implement classification and regression process techniques for data Processing.	6	0	2	1	9
PE-002.5: At the end of this chapter the student will apply statistics in machine learning for Probabilistic analysis.	6	0	2	1	9
Total Hours	30	0	10	5	45

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
PE-002.1	Students should be familiar with various characteristics of the spreadsheet.	02	05	01	08
PE-002.2	Learn how to format spreadsheet, and Viewing its appearance before printing.	02	03	05	10
PE-002.3	Importing/Exporting Access Data and Text Files. Securing worksheet and workbook.	02	03	07	12
PE-002.4	Calculate values and process data through various formula, and using data validation formula.	1	3	7	10
PE-002.5	Visualize data values through various types of charts.	1	05	05	10
Total		13	26	13	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Data Analytics & Visualization through Spread Sheet will be held with written examination of 50 marks.

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Suggested Learning Resources:

a. Books:

S. No.	Title	Author	Publisher	Edition &Year
1	Beginning OpenOffice Calc: From Setting Up Simple Spreadsheets to Business Forecasting	Jacek Artymiak	Apress	2011, 1st Edition
2	Microsoft Excel 2019 Bible: The Comprehensive Tutorial Resource	Michael Alexander Richard Kusleika John Walkenbach	Wiley Publication	2018, 1st Edition
3	Excel: Quick Start Guide from Beginner to Expert (Excel, Microsoft Office)	William Fischer	CRC Press	2016, 1st Edition

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COs, POs and PSOs Mapping

Program: B.Sc.(IT)

Course Code:03CA301

Course Title: Data Analytics & Visualization through Spread Sheet

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Computer knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help o AI and Data Science Technologies.
CO 1: Students should be familiar with various characteristics of the spreadsheet.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO 2: Learn how to format spreadsheet, and viewing its appearance before printing.	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3
CO 3: Importing/Exporting Access Data and Text Files. Securing worksheet and workbook.	2	2	1	1	1	2	2	2	1	2	1	2	1	1	2	2	2
CO 4: Calculate values and process data through various formula, and using data validation formula.	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2	2
CO 5: Visualize data values through various types of charts.	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: Students should be familiar with various characteristics of the spreadsheet.	SO1.1 SO1.2 SO1.3 SO1.4		Unit-1 Introduction to Spreadsheet 1.1,1.2,1.3,1.4,1.5,1.6	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: Learn how to format spreadsheet, and viewing its appearance before printing.	SO2.1 SO2.2 SO2.3 SO2.4		Unit-2 Printing Worksheet 2.1, 2.2, 2.3, 2.4, 2.5, 2.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3: Importing/Exporting Access Data and Text Files. Securing worksheet and workbook.	SO3.1 SO3.2 SO3.3 SO3.4		Unit-3 Import and Export Data 3.1,3.2,3.3,3.4,3.5,3.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 4: Calculate values and process data through various formula, and using data validation formula.	SO4.1 SO4.2 SO4.3 SO4.4		Unit-4 Calculations 4.1,4.2,4.3,4.4,4.5,4.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 5: Visualize data values through various types of charts.	SO5.1 SO5.2 SO5.3 SO5.4		Unit-5 Data Visualization 5.1,5.2,5.3,5.4,5.5,5.6	

AKS University

Faculty of Computer Application and Science & Technology
Department of Computer Application and Science & Technology Curriculum of B.Sc. (IT) [Program
(Revised as on 01 August 2023)

Semester-III

Course Code: 0CA303

Course Title: Cloud Computing

Pre-requisite: Database Management System

Rationale: Cloud Computing is important because it helps to process and store large amount of data sets on virtual space.

Course Outcomes:

CO1: Students should be familiar with various characteristics of the cloud platforms.
CO2: Learn how virtual platform works for application execution and storage.
CO3: Create relational database and other cloud-based file system.
CO4: Understand the privacy issues and security strategies in cloud storage.
CO5: Implement real time application over various cloud-based platform.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Program Core (PCC)	0CA303	Cloud Computing	4	0	2	1	7	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e., Lecturer (L) and Tutorial (T) And others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini projected.),
SL: Self-Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback teachers ensure outcome of Learning.

Scheme of Assessment: Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+ CAT+AT)		
PE	0CA303	Cloud Computing	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

CO1: Students should be familiar with various characteristics of the cloud platforms.

Approximate Hours

Item	Appx. Hrs.
CI	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO1.1 Understanding the characteristics of cloud. **SO1.2** Understanding various components of cloud. **SO1.3** Understanding various models of cloud. **SO1.4** Understanding cloud computing platforms.		**Unit-1.0 Cloud Computing** 1.1 Introduction, Definition, characteristics, 1.2 components, 1.3 Cloud service provider, 1.4 The role of networks in Cloud computing, 1.5 Cloud deployment models- private, public, hybrid, 1.6 Cloud service models, 1.7 Multitenancy, Cloud economics and benefits. 1.8 Cloud computing platforms, 1.9 IaaS: AmazonEC2, S3 Bucket, 1.10 PaaS: Google App Engine, 1.11 Microsoft Azure, 1.12 SaaS: AWS IAM (Identity andAccess Management).	1. Learning basic features and components of sheets.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

1. Private, Public and Hybrid Cloud.
2. Amazon EC2, Google App Engine, Microsoft Azure.

b. Mini Project:

Cloud Internet Service Provider (ISP)

c. Other Activities (Specify):

NA

CO2: Learn how virtual platform works for application execution and storage.

Approximate Hours

Item	Appx. Hrs.
CI	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO2.1 Understanding Significance and types ofvirtualizations. **SO2.2** Understanding various types of virtual machine. **SO2.3** Understanding basics of hypervisor and its types. **SO2.4** Understanding virtual box and other modern virtual machines.		**Unit-2.0 Virtualization** 2.1 Virtualization concepts, 2.2 Virtual machine, Introduction to Containerization Technology 2.3 Server virtualization, 2.4 Storage virtualization, 2.5 Storage services, 2.6 Network virtualization, 2.7 Service virtualization, 2.8 Virtualization management, 2.9 Virtualization technologies and architectures, 2.10 Measurement and profiling of virtualized applications, 2.11 Hypervisors: KVM, 2.12 Xen,VM ware hypervisors and their features.	1. Learning sheet formatting and its preview.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Types of Virtualizations
2. Types of Hypervisors

b. Mini Project:

Storage virtualization & Network virtualization

c. Other Activities (Specify):

NA

CO3: Create relational database and other cloud-based file system.

Approximate Hours

Item	Appx. Hrs.
CI	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction(LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO3.1 Understanding various types of cloud file system. **SO3.2** Understanding basics of MapReduce Model. **SO3.4** Understanding parallel computing. **SO3.3** Understanding relational operations with MapReduce model.		**Unit-3.0 Data in cloud computing** 3.1 Relational databases, 3.2 Cloud file systems, GFS and HDFS, 3.3 Big Table, HBase and Dynamo, 3.4 Map Reduce and extensions, 3.5 The Map-Reduce model, 3.6 Parallel computing, 3. 7 Parallel efficiency of Map Reduce, 3.8 Relational operations using 3..9 Map-Reduce, 3.10 Enterprise 3.11 batch processingusing Map Reduce. 12. case studies	Exporting and Importing data and protecting sheets.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. GFS
2. HDFS

b. Mini Project:

MapReduce Model

c. Other Activities (Specify):

NA

CO4: Understand the privacy issues and security strategies in cloud storage.

Approximate Hours

Item	Appx. Hrs.
CI	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Understanding security fundamentals in cloud system. **SO4.2** Understanding cloud security architecture. **SO4.3** Understanding trusted cloud computing. **SO4.4** Understanding identity management and access control.		**Unit-4.0 Cloud Security** 4.1 Cloud security fundamentals, 4.2 Vulnerabilityassessment tool for cloud, 4.3 Privacy and Security in cloud. 4.4 Cloud computing security architecture – 4.5 General Issues, Trusted Cloud computing, 4.6 Secure Execution Environments and Communications, 4.7 Micro- architectures; 4.8 Identity Management and Access control, Autonomicsecurity. Security challenges: 4.9 Virtualization security management, Virtual threats, 4.10 VM Security Recommendations, VM - Specific Security techniques, 4.11 Secure Execution Environments and	Learning different types of formula and data validation methods.

		4.12Communications in cloud.	

SW-4 Suggested Sessional Work (SW):

a. Assignments:
1. Privacy and Security in Cloud.
2. Virtualization Security Management.

b. Mini Project:
Identity Management and Access Control

c. Other Activities (Specify):
NA.

CO5 Implement real time application over various cloud-based platform.

Approximate Hours

Item	Appx. Hrs.
CI	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes(SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO5.1 Understanding implementing real time application over cloud platform. **SO5.2** Understanding Billing and Accounting System. **SO5.3** Understanding loadbalancing in cloud. **SO5.4** Understanding resource Optimization and reconfiguration.		**Unit-5.0 Issues in cloud computing** 5.1 Implementing real time application over cloud platform, 5.2 Issues in Inter-cloud environments, 5.3QOS Issuesin Cloud, 5.4 Monitoring in Cloud. 5.5 Dependability, Data migration, 5.6 Streaming inCloud, 5.7 Load balancing, 5.8 Quality of Service (QoS) monitoring in a Cloud computing environment,	Creating different types of charts.

		5.9 Cloud Middleware, 5.10 Mobile Cloud Computing, 5.11Inter Cloud issue, A grid ofclouds, 5.12 Sky computing, Resource optimization, Resource dynamic reconfiguration,	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Data Migration
2. Resource Optimization

b. Mini Project:

Mobile Cloud Computing

c. Other Activities (Specify):

NA.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	LI (Laboratory Instruction)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
CO1**:** student should be familiar with various Characteristics of the cloud platforms.	12	0	2	1	15
CO2: will learn how virtual platform works for application Execution and storage.	12	0	2	1	15

CO3: Student will create relational database and other cloud-based filesystem.	12	0	2	1	15
CO4: student will understand the privacy issues and Security strategies in cloud storage.	12	0	2	1	15
CO5: student will implement real time application over Various cloud-basedplatform.	12	0	2	1	15
Total Hours	60	0	10	5	75

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO1	Students should be familiar with various Characteristics of the cloud platforms.	02	05	01	08
CO2	Learn how virtual platform works for application execution and storage.	02	03	05	10
CO3	Create relational database and other cloud-based file system.	02	03	07	12
CO4	Understand the privacy issues and security strategies in cloud storage.	1	3	6	10
CO5	Implement real time application over various cloud-based platform.	1	05	04	10
Total		08	19	23	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Cloud Computing will be held with written examination of 50 marks.

Suggested Learning Resources:

a. Books:

S. No.	Title	Author	Publisher	Edition &Year
1	Enterprise Cloud Computing	Shroff Gautam	Cambridge Publication	2010, 1st Edition
2	Cloud Security	Dr. Kumar	Wiley-India	2012, 2nd Edition
3	Cloud Computing: A Practical Approach	Antohy T Velte	McGraw Hill	2009, 1st Edition

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COs, POs and PSOs Mapping

Program: B.C.A
Course Code: 0CA303
Course Title: Cloud Computing

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Computer knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions fo societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help o AI and Data Science Technologies.
CO 1: Students should be familiar with various characteristics of the spreadsheet.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO 2: Learn how to format spreadsheet, and viewing its appearance before printing.	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3
CO 3: Importing/Exporting Access Data and Text Files. Securing worksheet and workbook.	2	2	1	1	1	2	2	2	1	2	1	2	1	1	2	2	2
CO 4: Calculate values and process data through various formula, and using data validation formula.	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2	2
CO 5: Visualize data values through various types of charts.	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: Students should be familiar with various characteristics of the cloud platforms.	SO1.1 SO1.2 SO1.3 SO1.4		Unit-1 Cloud Computing 1.1,1.2,1.3,1.4,1.5,1.6	As mentioned inpage number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: Learn how virtual platform works for application execution and storage.	SO2.1 SO2.2 SO2.3 SO2.4		Unit-2 Virtualization 2.1, 2.2, 2.3, 2.4, 2.5, 2.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 3: Create relational database andother cloud-based file system.	SO3.1 SO3.2 SO3.3 SO3.4		Unit-3 Data in Cloud Computing 3.1,3.2,3.3,3.4,3.5,3.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 4: Understand the privacy issuesand security strategies in cloud storage.	SO4.1 SO4.2 SO4.3 SO4.4		Unit-4 Cloud Security 4.1,4.2,4.3,4.4,4.5,4.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 5: Implement real time application over various cloud-based platform.	SO5.1 SO5.2 SO5.3 SO5.4		Unit-5 Issues in cloud computing 5.1,5.2,5.3,5.4,5.5,5.6	

AKS University

Faculty of Computer Application and Science & Technology

Department of Computer Application and Science & Technology Curriculum of B.Sc. (IT) [Program

(Revised as on 01 August 2023)

Semester-III

Course Code: **01CA312**

Course Title: Object Oriented Programming Using C++

Pre-requisite: Fundamentals of Programing and Programing in C

Rationale: This subject on Object-Oriented Programming (OOP) in C++ is designed to provide students with a fundamental understanding of software development principles. Starting with the evolution of methodologies, it covers C++ basics, control structures, functions, classes, and objects. Advanced topics include constructors, operator overloading, inheritance, and pointers.

Course Outcomes:

On successful completion of this course, the students will be able to:

01CA312.1	OOP Mastery: Students will grasp key Object-Oriented Programming principles, applying encapsulation, inheritance, and polymorphism for effective problem-solving.
01CA312.2	Attain mastery in C++ programming, from fundamental constructs to advanced topics like operator overloading and dynamic memory management.
01CA312.3	Modular Design Skills: Develop expertise in modular design, utilizing functions, classes, and object-oriented principles to create scalable and maintainable software solutions.
01CA312.4	Data Persistence Proficiency: Acquire skills in file and stream operations, enabling efficient data reading/writing and ensuring effective management of data persistence in C++ applications.
01CA312.5	Advanced Concept Application: Apply advanced concepts like multiple inheritance, virtual functions, and memory management to solve complex programming challenges and contribute effectively to software development projects.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credit (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Program Core (PCC)	01CA312	Object Oriented Programming Using C++	4	4	1	1	10	6

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, Field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
PCC	01CA312	Object Oriented Programming Using C++	15	20	5	5	5	50	50	100

Practical

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)						
			Progressive Assessment (PRA)					End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Viva1 (5)	Viva2 (5) (SA)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
Major	01CA321	Object Oriented Programming with C++	35	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course

Outcomes (COs) upon the course's conclusion.

01CA3121 **OOP Mastery: Students will grasp key Object-Oriented Programming principles, applying encapsulation, inheritance, and polymorphism for effective problem-solving.**

Approximate Hours

Item	Appx. Hrs.
Cl	15
LI	12
SW	1
SL	1
Total	29

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
O1.1 Understanding Software Evolution **SO1.2** Appreciating OOP Concepts **SO1.3** Mastery of C++ Basics **SO1.4** Evaluation of Traditional Approaches **SO1.5** Structured Methodology Solution .	1. Write a program in C++ to exchange the content of two variables using call by reference. 2. Write a program in C++ to demonstrate the use of this pointer. 3. Write a program in C++ to demonstrate constructor with default argument 4. WAP to demonstrate Class. 5. WAP to demonstrate object. 6. WAP to demonstrate member function.	**Unit-1 Introduction to Object Oriented Programing** 1.1 Software Evolution • Discuss the limitations of traditional approaches, leading to the need for structured methodologies. • Provide an overview of the historical evolution of software development methodologies.1.2 Functions and Arrays: 1.2 Structured Methodology Overview: • Present the key principles of structured methodologies in software development. • Illustrate the advantages and challenges associated with structured methodologies. 1.3 Object-Oriented Paradigm • Introduce the core concepts of Object-Oriented Programming (OOP). • Discuss the principles of encapsulation, inheritance, and	Basic Feature of C# Programing, Syntax Based Code.

		polymorphism. 1.4 Benefits of OOP: • Highlight the advantages of employing an object-oriented paradigm in software development. • Showcase real-world examples where OOP principles enhance code maintainability and reusability.	
		1.5 Basic C++ Programming: • Cover essential C++ programming basics, including program construction and input/output operations using cin/cout. • Explore basic and user-defined data types, manipulators, type conversions, and arithmetic operators. 1.6 Encapsulation in OOP: • Define encapsulation and its role in OOP. • Discuss how encapsulation enhances code modularity and security. • Provide examples demonstrating the implementation of encapsulation in C++. 1.7 Inheritance and Polymorphism: • Explain the concepts of inheritance and polymorphism in OOP. • llustrate how inheritance promotes code reuse and polymorphism facilitates flexibility in design. • Conduct coding exercises to practice implementing inheritance and polymorphism in C++ programs.	

		1.8 Understanding Classes and Objects: • Define classes and objects in the context of OOP. • Differentiate between class attributes and	
		Methods, and object instances. • Guide students through creating and using classes and objects in C++ programs. 1.9 Dynamic Memory Allocation: • Introduce dynamic memory allocation in C++. • Discuss the significance of dynamic memory management and potential pitfalls. • Demonstrate dynamic memory allocation techniques using new and delete operators. 1.10 Advanced C++ Programming Techniques: • Explore advanced C++ programming features such as function overloading, operator overloading, and templates. • Discuss the benefits and best practices associated with these techniques. • Provide hands-on exercises to reinforce understanding and application. 1.11 Exception Handling in C++: • Introduce exception handling mechanisms in C++. • Explain the concept of try-catch blocks and	

		exception propagation. • Illustrate how exception handling improves	
		Program robustness and reliability. 1.12 File Handling in C++: • Cover file input/output operations in C++. • Explain how to open, read from, and write to files using file streams. • Discuss error handling and file manipulation techniques. 1.13 Standard Template Library (STL): • Introduce the Standard Template Library (STL) in C++. • Discuss the various containers (e.g., vectors, lists, maps) and algorithms provided by the STL. • Demonstrate how to use STL components effectively in C++ programs. 1.14 Object-Oriented Design Principles: • Explore fundamental design principles in OOP, such as SOLID principles. • Discuss how adhering to these principles promotes code maintainability, scalability, and extensibility. • Analyse case studies or real-world examples to illustrate the application of design principles. 1.15 Design Patterns:	

		• Introduce commonly used design patterns in software development. • Discuss the purpose and benefits of design patterns in achieving reusable and maintainable code. • Provide examples of popular design patterns such as Singleton, Factory, and Observer.	

SW-1 Suggested Sessional Work (SW):

Assignments:

I. Provide a brief analysis of their differences and propose a scenario illustrating the advantages of structured methodologies.

II. Choose a scenario, create a class diagram, and explain how encapsulation, inheritance, and polymorphism enhance the design.

Mini Project:

I. C++-based Student Information System with OOP Principles Implementation.

01CA312.2 Attain mastery in C++ programming, from fundamental constructs to advanced topics like operator overloading and dynamic memory management.

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO2.1 Mastery of Control Structures. **SO2.2** Proficiency in Functions. **SO2.3** Application of Classes and Objects. **SO2.4** Exploration of Structured and Enumerated Variables. **SO2.5** Hands-on Experience with Control Statements:	2.1 Write a program in C++to demonstrate multiple inheritance. 2.2 Write a program in C++ to copy the content of a file into another (assume suitable data). 2.3 Write a program in C++to append the content of a file into another (assume suitable data). 2.4 WAP to demonstrate if-else. 2.5 WAP to demonstrate functions 2.6 WAP to demonstrate inline function.	**Unit-2.0 Control Structures** 1.1 Control Structure Comprehensive. • Provide a comprehensive overview of relational operators, introducing their role in decision-making processes. • Illustrate the syntax and application of loops (for, while, do-while) as fundamental control structures. 1.2 Deep Dive into Decision-Making Structures • Explore decision-making structures such as if, if...else, and switch statements, emphasizing their use in creating flexible and efficient programs. • Facilitate practical exercises to reinforce understanding and application of decision-making structures. 1.3 Functions Mastery: • Introduce the concept of functions, covering simple functions and the importance of modular programming. • Dive into function prototyping, emphasizing its role in function declaration and calling. 1.4 Variable and Storage Classes Exploration • Discuss variable and storage classes, elucidating their impact on variable scope and lifetime. • Illustrate the use of enumerated variables for	1 Variable and Storage Classes Exploration

		Improved code organization and readability. 1.5 Classes and Objects Workshop: • Introduce the principles of classes and objects, guiding students in specifying a class and defining member functions. • Engage in practical exercises involving arrays within a class, passing objects as function arguments, and returning objects. 1.6 Advanced Looping Techniques: • Expand upon loop structures by exploring advanced techniques such as nested loops and loop control statements (break, continue). • Discuss best practices for optimizing loop performance and readability in code. 1.7 Comprehensive Coverage of Logical Operators: • Provide a detailed explanation of logical operators (AND, OR, NOT) and their significance in decision-making and control flow. • Illustrate logical operator usage through real-world examples and scenarios. 1.8 Utilizing Goto Statements: • Introduce the controversial goto statement and its role in	

		altering control flow within a program. • Discuss the potential risks and benefits associated with using goto statements and encourage judicious usage. 1.9 In-depth Analysis of Inline Functions: • Explore the concept of inline functions and their impact on code efficiency. • Compare and contrast inline functions with regular functions, highlighting scenarios where inline functions offer advantages. 1.10 Understanding Overloaded Functions: • Delve into the concept of function overloading, wherein multiple functions share the same name but differ in parameters or return types. • Demonstrate how overloaded functions enhance code flexibility and readability. 1.11 Exploring Private Member Functions: • Discuss the significance of private member functions in encapsulation and data hiding within classes. • Provide examples to illustrate how private member functions	

		contribute to code security and maintainability. 1.12 Array of Objects and Dynamic Memory Allocation: • Extend the discussion on arrays within a class by exploring the concept of arrays of objects. • Introduce dynamic memory allocation for objects within arrays and discuss memory management strategies.	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

d. Contrast the "for" and "while" loops in C++, highlighting their key differences and provide a scenario favouring the use of one over the other.

e. Explain the importance of function prototyping in C++ for modular programming and provide a concise code example demonstrating its application.

Mini Project:

- "Expense Tracker App Using C++ and OOP"

01CA312.3 Modular Design Skills: Develop expertise in modular design, utilizing functions, classes, and object-oriented principles to create scalable and maintainable software solutions.

Approximate Hours

Item	AppX Hrs
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO3.1 Constructor and Destructor Proficiency **SO3.2 Operator Overloading Mastery** **SO3.3 Inheritance Understanding:** **SO3.4 Pointer Manipulation Skills:** **SO3.5 Application of Virtual Functions and Polymorphism:**	3.1 Write aC++ program to implement Complex class for complex number to add two complex number using operator overloadin g. 3.2 Write a program to implement an Account Class with member functions to Compute Interest, Show Balance, Withdraw and Deposit amount from the Account. 3.3 Write a program in C++to demonstrat e virtual function 3.4 WAP to demonstrat e single inheritance 3.5 WAP to demonstrat e multiple inheritance 3.6 WAP to demonstrat e multilevel inheritance.	**Unit-3.0 Module, Design, Skill** 3.1 Constructor and Destructor Implementation • Provide step-by-step guidance on implementing constructors and destructors in C++, covering parameterized constructors, multiple constructors within a class, and dynamic object initialization using new operators. 3.2 Operator Overloading Workshop: • Conduct hands-on exercises on operator overloading, emphasizing both unary and binary operators, including arithmetic operations, comparisons, and assignments. Illustrate type conversions and their significance. 3.3 Inheritance Principles Discussion • Discussion on inheritance, differentiating between public and private inheritance, and guide them through practical examples of implementing multiple inheritance, paying special attention to constructor behaviors.3.4 Cross-Platform Mobile App Development 3.4 Pointer Manipulation Practical Session • Facilitate a practical session on pointer manipulation, covering the basics of addresses and pointers, pointer variables, pointers and arrays, pointers and functions, and the dynamic allocation and deallocation of memory using new and delete operators. 3.5 Virtual Functions and	1 Operator Overloading

		Polymorphism Application • Guide students through the application of virtual functions, showcasing their role in accessing normal and virtual member functions with pointers. Implement pure virtual functions, discuss abstract classes, and illustrate the concept of virtual base classes for achieving polymorphism. 3.6 Advanced Constructor Techniques: • Explore advanced constructor techniques such as constructors with default arguments and delegating constructors. • Discuss best practices for constructor design and initialization in various scenarios. 3.7 Destructors and Resource Management: • Deep dive into the role of destructors in resource management, including memory deallocation and resource clean-up. • Discuss strategies for handling exceptions and resource leaks within destructors. 3.8 Comprehensive Operator Overloading: • Provide an in-depth exploration of operator overloading, covering various aspects such as overloading unary and binary operators, including arithmetic, comparison, and assignment operators.	

		• Illustrate the importance of operator overloading in simplifying code and improving readability. 3.9 Overriding and Overloading: Clarifying the Distinction: • Clarify the distinction between overriding and overloading in object-oriented programming. • Provide examples to illustrate how overriding is used to redefine inherited methods, while overloading involves creating multiple methods with the same name but different parameters. 3.10 Dynamic Memory Allocation and Smart Pointers: • Expand on pointer manipulation by introducing smart pointers as a safer alternative to raw pointers. • Discuss the usage of unique_ptr, shared_ptr, and weak_ptr for dynamic memory allocation and resource management. 3.11 Application of Inheritance in Real-world Scenarios: • Explore real-world scenarios where inheritance is utilized for code reuse and extensibility. • Analyze case studies or examples from industry applications to demonstrate the practical significance of inheritance. 3.12 Polymorphism in Practice:	

		• Engage students in practical exercises to implement polymorphism using virtual functions and inheritance. • Encourage exploration of polymorphic behavior in different contexts to deepen understanding.	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. Guide students through the application of virtual functions, showcasing their role in accessing normal and virtual member functions with pointers. Implement pure virtual functions, discuss abstract classes, and illustrate the concept of virtual base classes for achieving polymorphism.

ii. Design a C++ program demonstrating inheritance with both public and private access specifiers. Incorporate pointer manipulation to showcase the interaction between base and derived class objects.

b. Mini Project:

i. Develop a console-based quiz management system using C++ and OOP principles. Implement classes for quizzes, questions, and user scores, demonstrating encapsulation, inheritance, and polymorphism.

01CA312.4 Data Persistence Proficiency: Acquire skills in file and stream operations, enabling efficient data reading/writing and ensuring effective management of data persistence in C++ applications.

Approximate Hours

Item	AppX Hrs
Cl	10
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO4.1 In-depth Understanding of Inheritance. **SO4.2** Mastery of Multiple Inheritance. **SO4.3** Constructor Management in Multiple Inheritance. **SO4.4** Advanced Pointer Concepts. **SO4.5** Application of Virtual Base Classes.	4.1 Write a program in C++to demonstrat e friend function. 4.2 Write aC++ program to make calculator using Class template 4.3 Write a Program for Static Data and Member Function Using C++. 4.4 WAP to demonstrate pointer 4.5 WAP to demonstrate pointer of pointers. 4.6 WAP to demonstrate virtual class.	**Unit-4.0 Inheritance, Constructor.** 4.1 Comprehensive Understanding of Multiple Inheritance. • Students will gain a thorough understanding of the principles of multiple inheritance, including the concepts of derived and base classes, and the implications of incorporating multiple functions from different classes. 4.2 Effective Management of Constructors in Multiple Inheritance. • Students will master the skills needed to manage constructors in scenarios involving multiple inheritance, understanding the order of execution and addressing challenges associated with constructor interactions. 4.3 Proficiency in Advanced Pointer Concepts. • Students will develop advanced skills in pointer manipulation, specifically focusing on pointers to objects, pointers to functions, and the strategic use of new and delete operators for memory management within the context of multiple inheritance. 4.4 Application of Virtual Base Classes for Ambiguity Resolution. • Students will apply the concept of virtual base classes to effectively resolve issues related to ambiguities in function calls that may arise in the context of multiple inheritance, ensuring a coherent and unambiguous program structure.	Exception Handling & String.

		4.5 Problem-Solving Through Multiple Inheritance. • Solve real-world programming challenges through the application of multiple inheritance, demonstrating an ability to design and implement efficient and logically structured solutions using C++. 4.6 Exploration of Protected Inheritance: • Introduce the concept of protected inheritance and discuss its role in extending classes while maintaining data encapsulation. • Illustrate scenarios where protected inheritance is advantageous and provide guidelines for its appropriate usage. 4.7 Addressing Diamond Inheritance Problem: • Discuss the diamond inheritance problem that arises in multiple inheritance scenarios and its resolution using virtual inheritance. • Guide students through practical examples to understand how virtual inheritance mitigates ambiguity and ensures a single copy of the base class. 4.8 Handling Constructor Initialization Lists: • Delve into the use of constructor initialization lists to initialize base class sub-objects in derived class constructors. • Illustrate best practices for utilizing constructor	

		Initialization lists to improve code efficiency and readability. 4.9 Pointer Arithmetic and Memory Management Techniques: • Expand on pointer manipulation by covering pointer arithmetic and its applications in array traversal and memory manipulation. • Discuss memory management techniques such as dynamic memory allocation, deallocation, and memory leaks prevention using smart pointers. 4.10 Case Studies in Inheritance and Pointer Utilization: • Analyze case studies or real-world examples where inheritance and pointer manipulation play crucial roles in software development. • Encourage students to critically evaluate and solve the presented problems using inheritance and advanced pointer concepts.	

SW-4 **Suggested Sessional Work (SW):**

d. Assignments:

- Design a C++ program demonstrating multiple inheritance. Create a scenario with at least three classes, incorporating both public and private inheritance. Implement functions in each class and illustrate how the derived class inherits from multiple base classes
- Develop a C++ program that explores the management of constructors in the context of multiple inheritance. Highlight the order of constructor execution and potential challenges, and demonstrate how virtual base classes can be utilized to address ambiguities.

e. Mini Project:

- Task: Console-based student management system using C++ that incorporates Object-Oriented

Programming principles. Utilize classes for students, courses, and grades, and implement file handling to persist and retrieve student information.

01CA312.5 Advanced Concept Application: Apply advanced concepts like multiple inheritance, virtual functions, and memory management to solve complex programming challenges and contribute effectively to software development projects.

Approximate Hours

Item	Appx. Hrs.
Cl	11
LI	12
SW	1
SL	1
Total	25

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO5.1 Virtual Functions Implementation **SO5.2** Understanding Pure Virtual Functions. **SO5.3** Proficiency in Abstract Classes. **SO5.4** Application of Virtual Base Classes: **SO5.5** Hands-on Experience with Files and Streams:	5.1 Write a program to print a pyramid pattern in C++. 5.2 Write a program to handle exceptionin C++. 5.3 Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and IncomeTax (IT) =30% of the gross salary). 5.4 WAP to demonstrate pure virtual functions. 5.5 WAP to demonstrate abstract classes.	**Unit-5.0 Function, Abstract, Classes.** 5.1 Virtual Functions • Provide a detailed walkthrough of virtual functions in C++, emphasizing their implementation and role in accessing both normal and virtual member functions through pointers. 5.2 Exploration of Pure Virtual Functions • Engage students in an in-depth exploration of pure virtual functions, elucidating their purpose in creating abstract classes and serving as a foundation for derived class implementations. 5.3 Practical Application of Abstract Classes • Guide students in the practical application of abstract classes,	1 Pure Virtual Functions

	5.6 WAP to demonstrate File handling.		
		Showcasing how they establish a common interface for derived classes while preventing instantiation. Encourage hands-on exercises to reinforce concepts. 5.4 Effective Use of Virtual Base Classes. • Explain the application of virtual base classes in resolving complexities associated with multiple inheritance. Illustrate their role in ensuring a coherent and unambiguous program structure. 5.5 Hands-on Experience with Files and Streams. • Conduct practical sessions on C++ file and stream operations, covering string I/O, character I/O, and object I/O. Demonstrate writing/reading objects to/from disk and discuss the differences between binary and character files. Encourage students to practice through coding exercises. 5.6 Advanced File Handling Techniques: • Explore advanced file handling techniques such as random access, file manipulation, and error handling. • Discuss how to efficiently navigate and manipulate files using C++ standard library functions. 5.7 Exception Handling in File Operations: • Introduce exception handling mechanisms in file operations to deal with potential errors such as file	

		Not found or permission denied. • Provide examples demonstrating the usage of try-catch blocks to handle file-related exceptions gracefully. 5.8 File Compatibility and Data Structures: • Discuss strategies for ensuring compatibility between data structures and file formats in C++ file I/O operations. • Illustrate how to serialize and deserialize data structures for seamless storage and retrieval from files. 5.9 Exploring Stream Manipulators: • Delve into the use of stream manipulators to format input and output streams in C++. • Cover commonly used manipulators such as setw, setprecision, and fixed, and demonstrate their application in controlling formatting. 5.10 File I/O Best Practices and Optimization: • Provide guidelines and best practices for efficient file I/O operations, including buffering, file opening modes, and resource management. • Discuss strategies for optimizing file I/O performance and minimizing overhead in file handling operations. 5.11 Secure File Handling Techniques: • Discuss secure file handling techniques such as file Permissions, encryption, and integrity checks.	

		• Provide guidance on implementing secure file operations to protect sensitive data from unauthorized access or tampering.	

SW-5 Suggested Sessional Work (SW):

c. Assignments

i. Design an abstract class representing a geometric shape with pure virtual functions for calculating area and perimeter. Implement derived classes for specific shapes (e.g., rectangle, circle) and demonstrate the practical application of the abstract class.

ii. Develop a C++ program that utilizes file handling to maintain a student database. Implement functionalities for adding, modifying, and deleting student records. Use object I/O to write and read student objects to/from a file, ensuring proper data persistence.

b. Mini Project: Online Banking System in C++ with OOP

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instruction (LI)	Sessional Work (SW)	Self-Learning (Sl)	Total Hour (Cl+SW+Sl)
01CA312.1 OOP Mastery: Students will grasp key Object-Oriented Programming principles, applying encapsulation, inheritance, and polymorphism for effective problem-solving.	15	12	1	1	29
01CA312.2 Attain mastery in C++ programming, from fundamental constructs to advanced topics like operator overloading and dynamic memory management.	12	12	1	1	26
01CA312.3 Modular Design Skills: Develop expertise in modular design, utilizing functions, classes, and object-oriented principles to create scalable and maintainable software solutions.	12	12	1	1	26
01CA312.4 Data Persistence Proficiency: Acquire skills in file and stream operations, enabling efficient data reading/writing and ensuring effective management of data persistence in C++ applications.	10	12	1	1	26
01CA312.5 Advanced Concept Application: Apply advanced concepts like multiple inheritance, virtual functions, and memory management to solve complex programming challenges and contribute effectively to Software development projects.	11	12	1	1	25
Total Hours	60	60	5	5	130

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
01CA312.1	Task: Assign a substantial coding project that integrates multiple concepts covered throughout the course. This project should involve aspects such as classes, inheritance, and polymorphism, file I/O, and exception handling. Objective: Evaluate students' ability to apply learned concepts in a real-world scenario and assess their coding proficiency.	02	01	01	04
01CA312.2	Task: Present a set of complex problems that require the application of various programming concepts, including strings, arrays, and control statements. Objective: Assess students' problem-solving skills and their ability to choose and implement The appropriate programming constructs.	02	04	02	08
01CA312.3	Task: Have students participate in a code review session where they present and explain their code for a specific project or problem-solving task. Objective: Evaluate code quality, adherence to best practices, and the ability to communicate and defend coding decisions.	03	05	04	12
01CA312.4	Task: Include a written exam with a mix of theoretical and practical questions covering all units of the course, including topics like generics, delegates, reflection, and multithreading. Objective: Assess students' theoretical Knowledge, understanding of programming concepts, and ability to express ideas coherently.	02	08	05	15
01CA312.5	Task: Assign a mini project related to web service integration or another advanced topic covered in The course. Have students present their projects,	03	05	03	11

	Explaining the design decisions, challenges faced, and solutions implemented. Objective: Evaluate practical application skills, project management, and communication skills.				
Total		12	23	15	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Data Analytics & Visualization will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit any software development company
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook,Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

Textbooks:

1. E. Balagurusamy, "Object-Oriented Programming with C++", 8 th Edition, 2020, Mc-Graw Hill
2. K.R. Venugopal & Rajkumar Buyya, "Mastering C++", 20 13, McGraw Hill Education (India) Pvt. Ltd
3. Rajesh K. Shukla, "Object-Oriented Programming in C++", 2008, Wiley-India Edition
4. Books published by Madhya Pradesh Hindi Granth Academy, Bhopal Reference Book:
5. Herbert Schildt, "The Complete Reference C++", 4th Ed, 2003, Tata McGraw Hill
6. Sourav Sahay, "Object Oriented Programming with C++", 2ndEd, 2012, Oxford Press
7. Stanley Lippman, Josee Lajoie & Barbara E. Moo, "C++ Primer",5 th Ed, 20 12, Addison Wesley Prof.
8. Bjarne Stroustrup, "The C++ Programming Language", 4th Ed, 2013, Addison-Wesley, Pearson Education
9. Schaum'sOutlines Series "Programming with C++", 2001, Tata Mc-Graw Hill Education

CO, PO and PSO Mapping

Program: B.Sc. (IT)
Course Code: 01CA312
Course Title: **Object Oriented Programming Using C++**

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
S3-lTEC2T.1 OOP Mastery: Students will grasp key Object-Oriented Programming principles, applying encapsulation, inheritance, and polymorphism for effective problem-solving.	2	3	3	2	1	2	1	1	1	1	1	2	**2**	**3**	**1**	**2**	**2**
S3-lTEC2T.2 Attain mastery in C++ programming, from fundamental constructs to advanced topics like operator overloading and dynamic memory management.	2	2	3	3	1	2	1	1	1	1	1	3	**2**	**2**	**2**	**2**	**2**
S3-lTEC2T.3 Modular Design Skills: Develop expertise in modular design, utilizing functions, classes, and object-oriented	2	3	3	2	1	1	1	1	1	1	1	3	**1**	**1**	**2**	**2**	**2**

principles to create scalable and maintainable software solutions.																	
S3-lTEC2T.4 Data Persistence Proficiency: Acquire skills in file and stream operations, enabling efficient data reading/writing and ensuring effective management of data persistence in C++ applications.	2	2	3	3	1	2	1	1	1	1	1	3	**2**	**3**	**1**	**2**	**2**
S3-lTEC2T.5 Advanced Concept Application: Apply advanced concepts like multiple inheritance, virtual functions, and memory management to solve complex programming challenges and contribute effectively to software development projects.	2	3	3	3	2	2	1	1	1	1	3	3	**2**	**3**	**1**	**1**	**2**

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1:. **OOP Mastery: Students will grasp key Object-Oriented Programming principles, applying encapsulation, inheritance, and polymorphism for effective problem-solving.**	SO1.1, SO1.2, SO1.3, SO1.4, SO1.5, SO1.6, SO1.7, SO1.8, SO1.9, SO1.10, SO1.11, SO1.12, SO1.13		Unit-1 Assign a substantial coding project that integrates multiple concepts covered throughout the course 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9,1.10,1.11,1.12,1.13	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: **Attain mastery in C++ programming, from fundamental constructs to advanced topics like operator overloading and dynamic memory management.**	SO2.1, SO2.2, SO2.3, SO2.4, SO2.5, SO2.6, SO2.7, SO2.8, SO2.9, SO2.10, SO2.11, SO2.12, SO2.13		Unit-2 Present a set of complex problems that require the application of various programming 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9,2.10,2.11,2.12,2.13	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3:. **Modular Design Skills: Develop expertise in modular design, utilizing functions, classes, and object-oriented**	SO3.1, SO3.2, SO3.3, SO3.4, SO3.5, SO3.6, SO3.7, SO3.8, SO3.9, SO3.10, SO3.11, SO3.12		Unit-3 Have students participate in a code review session where they present and explain 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,3.10,3.11,3.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 4: **Data Persistence Proficiency: Acquire skills in file and stream operations, enabling efficient data reading/writing and ensuring effective management of data persistence in C++ applications.**	SO4.1, SO4.2, SO4.3, SO4.4, SO4.5, SO4.6, SO4.7, SO4.8, SO4.9, SO4.10, SO4.11		Unit-4 : Include a written exam with a mix of theoretical and practical questions covering all units 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 5: **Advanced Concept Application: Apply advanced concepts like multiple inheritance, virtual functions, and memory management to solve complex programming challenges and contribute effectively to software development projects.**	SO5.1, SO5.2, SO5.3, SO5.4, SO5.5, SO5.6, SO5.7, SO5.8, SO5.9, SO5.10, SO5.11		Unit-5 Assign a mini project related to web service integration or another 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10,5.11	

AKS University

Faculty of Computer Application and Science & Technology
Department of Computer Application and Science & Technology
Curriculum of B.Sc. (IT) [Program
(Revised as on 01 August 2023)

Semester-III

Course Code:	**02CA322**
Course Title:	**Data Structures**
Pre-requisite:	To study this Course, a student must have basic knowledge of computers
Rationale:	Data structures are used to implement the physical forms of abstract data types. Data structures are a crucial part of designing efficient software

Course Outcomes:

After completion of course, students would be able to:
02CA322.1: Understand the different types of data structure to be implemented using any programming language
02CA322.2: Choose the data structures that effectively model the information in a problem and an analysis the efficiency trade-offs (run time and memory usage) among alternative data structure implementation so combinations.
02CA322.3: Design, implement, test, and debug programs using a variety of data structures including stacks, queues, hash tables, binary and general tree structures, search trees, and graphs.
02CA322.4: Apply efficient data structure (linked lists, stacks and queues) to solve a particular problem.

PC203.5: Apply Sorting and Searching

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours(CI+LI+SW+SL)	
Program Core (PCC)	**02CA322**	Data Structures.	4	4	1	1	10	6

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback teachers ensure outcome of Learning.

Scheme of Assessment:
Theory

Board of Study	Cous e Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activityany one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
PCC	**02CA 322**	Data Structures	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Out comes (SOs), culminating in the overall achievement of Course Outcomes (COs) outer course's conclusion.

02CA322.1: Understand the different types of data structure to be implemented using any programming Language.

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO1.1 Understand the Data Structures and data types **SO1.2** Explain Recursion, time and space complexity of algorithms **SO1.3** Discuss Stacks, queues, Infix, Postfix & Prefix **SO1.4** Definition double Ended dequeue **SO1.**5 Explain priority queues	LI.1.1 Write a program to implement stack in c using an array. LI.1.2 Write a program to implement queue in c using an array. LI.1.3 Write a program to implement post fix conversion in c using stack. LI1.4 WAP to implement prefix conversion using stack. LI1.5 WAP to implement recursion . LI1.6 WAP to implement circular queue.	**Unit-1 Introduction**: (12-Lectures) 1.1 Introduction to Data Structures and data types 1.2 Efficient use of memory 1.3 Recursion 1.4 time and space complexity of algorithms 1.5 Big O Notation and the notations 1.6 Elementary Data Structures: Stacks and queues 1.7 Infix Postfix & Prefix conversions 1.8 evaluations of expressions 1.9 Multiple, stacks and queues. 1.10 priority queues 1.11 Double end dequeue. 1.12 implementation of stacks and queues	1. Recursion, time and space complexity of algorithms 2. Stacks, queues, Infix, Postfix & Prefix conversions

SW-1: Suggested Sessional Work (SW):

- ***b. Assignments:***
  - i. Stacks, queues, Infix
  - ii. multiple, stacks and queues,
  - iii. implementation of stacks and queues
- ***c. Mini Project:*** *None*
- ***d. Other Activities (Specify):*** *Seminar*

02CA322.2: Choose the data structures that effectively model the information in a problem and analyses the efficiency trade-offs (run time and memory usage) among alternative data structure implementations or combinations.

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	12

SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO2.1 To Understand the Singly linked lists **SO2.2** To learn polynomial addition, sparse matrices **SO2.3** To lean about doubly linked lists **SO2.4** Explain circular linked list SO2.5 Explain Applications of Stacks.	LI.2.1 Write a program to insert and delete elements from a singly linked list. LI.2.2 Write a program to implement doubly linked list. LI.2.3 Write a program to implement polynomial addition. LI2.4 WAP to implement circular doubly link list. LI2.5 WAP to implement circular link list.	Unit2: Linked Lists (10-Lectures) 2.1 Singly linked lists 2.2 linked stacks and queue 2.3 polynomial addition 2.4 sparse matrices 2.5 doubly linked lists, 2.6 circular linked list 2.7 dynamic storage manages 2.8 Applications of Stacks 2.9 Applications of Queues and 2.10 Applications of Linked lists 2.11 Garbage collection, 2.12 Josephus Problem	1.Linked stacks and queues 2. Doubly linked lists

SW-2 Suggested Seasonal Work (SW):

a. Assignments:

iv. Queues and Linked lists.

v. Garbage collection, Josephus Problem

vi. Polynomial addition, sparse matrices

02CA322.3: Design, implement, test, and debug programs using a variety of data structures including stacks, queues, hash tables, binary and general tree structures, search trees, and graphs.

Approximate Hours

Item	Appx. Hrs.

Cl	15
LI	12
SW	1
SL	1
Total	29

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO3.1 To Understand Basic terminology **SO3.2**To learn binary trees, binary tree **SO3.3**To understand traversal, representations of binary tree **SO3.4 Explain t**hreaded Trees **SO3.5** learn about AVL tree-tree	LI.3.1 Write a program to implement binary tree. LI.3.2 Write a program to implement binary search tree. LI.3.3 Write a program to implement AVL tree. LI3.4 WAP to implement threaded binary tree. LI3.5 WAP to implement B-tree. LI3.6 WAP to implement B+ tree.	Unit3: Trees (8-Lectures) 3.1 Basic terminology, 3.2 binary trees 3.3 traversal, 3.4 DFS 3.5 BFS 3.6 representations of binary tree, 3.7 application of trees 3.8 decision tree, 3.9 Example 3.10 game trees 3.11 Example 3.12 Threaded Trees 3.13 Binary Search Tree, 3.14 AVL tree, 3.15 B-tree	1. binary trees, binary tree 2. traversal, representations of binary tree

SW-3 Suggested Sessional Work (SW):

a. **Assignments:**

vii. Application of trees, decision tree, game trees,

viii. traversal, representations of binary tree

ix. AVL tree, B-tree

PC203.4: Apply efficient data structure (linked lists, stacks and queues) to solve a particular problem.

Approximate Hours

Item	Appx. Hrs.
Cl	09
LI	12
SW	1
SL	1

Total	23

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Evaluation of Graph presentations **SO4.2** Understanding the Graph Traversals **SO4.3** To learn 3Dijkstra's algorithm for Shortest path **SO4.4** To lean about Prim's and Kruskal's Algorithm **SO4.5** Discuss Minimal Spanning tree	LI.4.1 Write a program to implement graph in c. LI.4.2 Write a program to implement graph traversal in c. LI.4.3 Write a program to implement shortest path algorithm. LI4.4 WAP to implement minimum spanning tree. LI4.5 WAP implement dijkistr's algorithm. LI4.6 WAP to implement Prim's algorithm.	Unit-4: Graph Theory **(6-Lectures)** 4.1Graph representations I 4.2 1Graph representations II 4.3 Graph Traversals I 4.4 Graph Traversals II 4.5 Dijkstra's algorithm for Shortest path 4.6 Example 4.7 Minimum Spanning Tree 4.8 Prim's and 4.9 Kruskal's Algorithm for Minimal Spanning tree.	1. Graphrepresentations 2. Prim's and Kruskal's Algorithm for Minimal Spanning tree

SW-4 Suggested Sessional Work (SW):

Assignments:

a. Graph Traversals

b. 3Dijkstra's algorithm for shortest path

c. Prim's and Kruskal's Algorithm for Minimal Spanning tree

02CA322.5: Apply Sorting and Searching

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO5.1 To Understand Linear search **SO5.2** Explain binary search and hash search **SO5.3** learn this Sorting: Insertion sort **SO5.4** To understand quick sort **SO5.5** Explain heap sort, and Bucket sort	LI.5.1 Write a program to implement linear search and binary search. LI.5.2 Write a program to implement hash search. LI.5.3 Write a program to implement heap sort. LI5.4 WAP to implemenrt quick sort. LI5.5 WAP to implement bucket sort. LI5.6 WAP to implement bubble sort.	Unit5: Sorting and Searching **(Lectures 9)** 5.1 Searching: Linear search, 5.2 binary search 5.3 hash search. 5.4 Sorting: Insertion sort, 5.5 selection sort bubble sort, 5.6 quick sort, 5.7 Merge sort, 5.8 heap sort 5.9 Bucket sort	1. Bubble sort 2. Bucket sort

SW-5 Suggested Sessional Work (SW):

a. Assignments:

- **a.** Binary search and hash search.
- **b.** Selection sort, bubble sort, quick sort
- **c.** Heap sort, and Bucket sort

Brief of Hours suggested for the Course Outcome

Course Out comes	Class Lecture (Cl)	Laboratory Instruction	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
PC203.1: Understand the different types of data structure to be implemented using any programming Language.	12	**12**	01	01	26

PC203.2: Choose the data structures that effectively model the information in a problem and analyses the efficiency trade-offs (run time and memory usage) among alternative data structure implementations or Combinations.	12	**12**	01	01	26
PC203.3: Design, implement, test, and debug programs using a variety of data structures including stacks, queues, hash tables, binary and general tree structures, search trees, and graphs.	12	**12**	01	01	26
PC203.4: Apply efficient data structure (linked lists, stacks and queues) to solve a particular problem	15	12	01	01	29
PC203.5: Apply Sorting and Searching.	09	12	01	01	23
Total Hours	**60**	**60**	**5**	**5**	**130**

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Introduction and Elementary Data Structures	03	02	03	08
CO-2	Linked Lists	03	01	05	09
CO-3	Trees	03	07	02	12
CO-4	Graph Theory	03	05	05	13
CO-5	Sorting and searching	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Introduction to Data Structures will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture

2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to software industry
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

A. *Books:*

S. No.	Title	Author	Publisher	Edition &Year
1	Data Structures	R.S. Salari,	Khanna Book Publishing	2019
2	Data Structures and Program Design in CByRobertL Kruse,	C.L. Tondo, Bruce Leung	Pearson Education	2007
3	Expert Data Structures with C/3rdEdition	R.B. Patel	Khanna Book Publishing	2020

Curriculm Development Team

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CO, PO and PSO Mapping

Program: B.SC (IT)
Course Code: 02CA322
Course Title: Data Structures

Course Outcomes	Program Outcomes												Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2	PSO 3	PSO 4	PSO5
	Engineering knowledge	Problem Analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science
CO-1: Understand the different types of data structure to be implemented using any programming Language.	2	2	3	3	2	1	1	1	1	1	1	3	2	2	3	2	3
CO-2Choose the data structures that effectively model the information in a problem and analyses the efficiency trade-offs (run time and memory usage) among alternative data structure implementations or combinations.	2	3	2	3	2	2	1	1	1	1	1	3	2	3	2	3	3
CO-3 Design, implement, test, and debug programs using a variety of data structures including stacks, queues, hash tables, binary and general tree structures, search trees, and graphs	2	2	2	3	2	2	1	1	1	1	1	3	2	2	2	2	3
CO-4 Apply efficient data structure (linked lists, stacks and queues) to solve a particular problem.	2	2	3	2	2	2	1	1	1	1	1	3	2	2	3	2	2
CO 5: Apply Sorting and Searching	2	2	3	2	2	2	1	1	1	1	1	3	2	2	3	2	2

Course Curriculum Map:

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self learning (SL)
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO-1: Understand the different types of data structure to be implemented using any programming Language.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	LI.1.1, LI.1.2, LI.1.3	Unit-1.0 Introduction 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9.1.10,1.11,1.12	As mentioned above
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: Choose the data structures that effectively model the information in a problem and analyses the efficiency trade-offs (run time and memory usage) among alternative data structure implementations or combinations.	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5	LI.2.1, LI.2.2, LI.2.3	Unit-2 Linked Lists 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8,2.9,2.10	
PO 1,2,3,4,5,6 7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3 : Design, implement, test, and debug programs using a variety of data structures including stacks, queues, hash tables, binary and general tree structures, search trees, and graphs.	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5	LI.3.1, LI.3.2, LI.3.3	Unit-3 : Trees 3.1, 3.2,3.3,3.4,3.5,3.6,3.7,3.8	
PO 1,2,3,4,5,6 7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 4: Apply efficient data structure (linked lists, stacks and queues) to solve a particular problem.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5	LI.4.1, LI.4.2, LI.4.3	Unit-4: Graph Theory 4.1, 4.2,4.3,4.4,4.5,4.6	
PO 1,2,3,4,5,6 7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 5: Apply Sorting and Searching	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5	LI.5.1, LI.5.2, LI.5.3	Unit-5: Sorting and searching 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9	

AKS University

Faculty of Computer Application and Science & Technology
Department of Computer Application and Science & Technology
Curriculum of B.Sc. (IT) [Program
(Revised as on 01 August 2023)

Semester-III

Course Code: **03CA333**

Course Title: **Internet of Things**

Pre-requisite: Student should know basic knowledge of computer & digital Electronics.

Rationale:
1. 'It's all about the role of Sensors log Data!' IoT is the super set of Information technology driven by the sensors and cloud to make the real things like smart things for your network.
2. To understand the concepts of web of Things, Cloud of Things and emphasis on Mobile cloud.

Course Outcomes:

03CA333.1: Learn the basics of IoT and IoT Architectural view.
03CA333.2: Understand various theoretical and practical principles involved in the design of Data Storage in IoT and use of Software defined networking.
03CA333.3: Learn the Web communication Protocols for connected devices and Message communication Protocols for connected devices.
03CA333.4: Design and implement Sensor Technology and Participatory Sensing.
03CA333.5: Design an IoT Privacy and security solutions.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours(CI+LI+SW+SL)	
Program Core (36)	**03CA333**	IOT	6	0	0	0	6	6

Legend:CI: Classroom Instruction (Includes different instructional strategies i.e., Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.
Note: SW & SL has to be planned and performed under the continuous guidance and feedback ofteacher to ensure outcome of Learning.

Scheme of Assessment: Theory

Board of Stud	Couse Code	Course Title	Scheme of Assessment (Marks)

			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA + ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT +AT)		
	03CA333	IOT	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

03CA333.1: Learn the basics of IoT and IoT Architectural view.

Approximate Hours

Item	Appx Hrs.
Cl	12
LI	0
SW	1
SL	1
Total	14

Session Outcomes (SOs)	(LI)	Classroom Instruction (CI)	(SL)
SO1.1 Understand the Definition and Concept of Internet of Things. **SO1.2** Understand the concept of Characteristics of IoT **SO1.3** Understand the IoT Conceptual		**Unit-1.0 Theoretical Framework of IoT** 1.1. Introduction to IoT 1.2 Definition of IoT 1.3 Characteristics of IoT 1.4 IoT Conceptual framework 1.5 IoT Architectural 1.6 Physical design of IoT 1.7 Logical design of IoT 1.8 Application of IoT	1 IoT Architectural

Framework. **SO1.4** Preparation of Physical design, Logical design of IoT with Architectural view. **SO1.5** Preparation of Application of IoT.		1.9 learn by case study 1.10 learn by example 1.11 IoT view 1.12 Applications in education department	

03CA333.2: Understand various theoretical and practical principles involved in the design of Data Storage in IoT and use of Software defined networking.

Approximate Hours

Item	Appx Hours
Cl	12
LI	0
SW	1
SL	1
Total	14

Session Out comes (SOs)	**(LI)**	**Classroom Instruction (CI)**	**(SL)**
SO2.1 Concept of Machine-to-Machine (M2M) **SO2.2** Understanding about the SDN (Software defined networking). **SO2.3** Concept of NFV (Network function virtualization) for IoT. **SO2.4** Understanding the Data Storage in IoT. **SO2.5** Preparation of IoT cloud Based Services.	.	**Unit 2.0** Machine-to-Machine (M2M) 2.1 SDN (Software defined networking) and 2.2 NFV (Network function virtualization) 2.3 Data Storage in IoT. 2.4 IoT cloud Based Services. 2.5 SDN architecture 2.6 NFV architecture 2.7 Data Storage Techniques 2.8 IoT cloud Based Services for agriculture 2.9 Applications 2.10 Learn by example 2.11 Machine types 2.12 Case study	1 IoT cloud Based Services

03CA333.3: Learn the Web communication Protocols for connected devices and Message communication Protocols for connected devices.

Approximate Hours

Item	Appx Hours
Cl	16
LI	0
SW	0
SL	0
Total	16

Session Outcomes (SOs)	(LI)	Classroom Instruction (CI)	(SL)
SO3.1 concept of Design principles for web connectivity **SO3.2** Understanding Web communication Protocols for connected devices **SO3.3** Understanding the Message communication Protocols for connected devices. **SO3.4** Understanding about SOAP, REST, HTTP Restful and web Sockets. **SO3.5** Concept of Internet Connectivity, Internet based communication, IP addressing in IoT and Media Access Control.	.	**Unit-3.0** : Design principles for web connectivity 1. Web communication 2. Protocols for connected devices 3. Message communication 4. Protocols for connected devices. 5. SOAP, REST, HTTP 6. Restful and web Sockets. 7. Internet Connectivity Principles: 8. Internet Connectivity 9. Internet based communication 10. IP addressing in IoT 11. Media Access Control 12. Learning by example	

03CA333.4: Design and implement Sensor Technology and Participatory Sensing.

Approximate Hours

Item	Appx Hours
Cl	19
LI	0
SW	0
SL	0
Total	19

Session Outcomes (SOs)	(LI)	Classroom Instruction (CI)	(SL)
SO4.1 Understanding about the Sensor Technology **SO4.2** Preparation of Participatory Sensing **SO4.3** Understanding about the Industrial IoT and Automotive IoT **SO4.4** Actuator, Sensor data Communication Protocols **SO4.5** Understanding about the	.	Unit 4.0 Sensor Technology 4.1 Participatory Sensing 4.2 Industrial IoT and Automotive IoT 4.3 Actuator 4.4 Sensor data Communication Protocols 4.5 Radio Frequency Identification Technology	

Radio Frequency Identification Technology and Wireless Sensor Network Technology.		4.6 Wireless Sensor Network Technology.	

03CA333.5: Design an IoT Privacy and security solutions.

Approximate Hours

Item	Appx Hours
Cl	17
LI	0
SW	0
SL	0
Total	17

Session Outcomes (SOs)	**(LI)**	**Classroom Instruction (CI)**	**(SL)**
SO5.1 Understand about the concept of oT Design methodology: **SO5.2** Preparation of Specification-Requirement, Process, Model, service. **SO5.3** Preparation of necessary Functional & Operational View **SO5.4** Understanding about the IoT Privacy and security solutions, Raspberry Pi & Arduino devices **SO5.5** Understanding about the **IoT Case Studies**: Smart City Streetlights control & monitoring.		**Unit 5.0:** IoT Design methodology: 5.1 Specification 5.2 Requirement 5.3 Process, Model, service 5.4 Functional & Operational View 5.5 IoT Privacy and security solutions 5.6 Raspberry Pi & Arduino devices. 5.7 IoT Case Studies 5.8 Smart City Streetlights 5.9.Applictions in home security 5.10 Security Concepts. 5.11 Control & monitoring system 512 learn by real life example	1 IoT Case Studies

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
03CA333.1: Acquire the knowledge of IoT concept and its Architecture.	12	1	1	14

03CA333.2: Acquire the basic concept of Software defined networking and Machine-to-Machine (M2M).	12	1	1	14
03CA333.3: Exposed to various web communication Protocols for connected devices & Message communication Protocols for connected devices.	12	1	1	14
03CA333.4: Familiarize and understand the basic Sensor data Communication Protocols.	12	1	1	14
03CA333.5: Smart City Streetlights control & monitoring.	12	1	1	14
Total Hours	60	00	00	70

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Acquire the knowledge of IoT concept and its Architecture.	01	01	03	05
CO-2	Acquire the basic concept of Software defined networking and Machine-to-Machine (M2M).	01	01	03	05
CO-3	Exposed to various web communication Protocols for connected devices & Message communication Protocols for connected devices.	-	03	10	13
CO-4	Familiarize and understand the basic Sensor data Communication Protocols.	-	03	10	13
CO-5	Develop the application skills regarding the Smart City Streetlights control & monitoring.	01	03	10	14
Total		03	12	36	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Financial Accounting will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

i. Improved Lecture
ii. Tutorial
iii. Case Method
iv. Group Discussion
v. Brainstorming

Suggested Learning Resources:

(a) Books:

S. No.	Title	Author	Publisher	Edition & Year
1	"Internet of Things "(A Hand book approach)	Vijay Madisetti & Arshdeeep Bahga	Universal Press	First Edition
2	"The Internet of Things: Connecting Objects"	Hakima Chaouchi	Wiley publication	
3	"MySQL for The Internet of Things"	Charless Bell	A Press publication.	
4	MP Hindi Granth Academy, Bhopal			
5	Lecture note provided by Dept. of C A & I T And Science, AKS University, Satna.			

CO, PO and PSO Mapping

Course Title: B.Sc. (IT)
Course Code: 03CA333
Course Title: Internet of Things (IOT)

Course Outcomes	Program Outcomes												Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
	Computational information	Difficulty Analysis	Drawing / Improvement of Solutions	Accomplish Investigations of Compound Computing Troubles	: Current Implement Procedure	Proficient Principles	Ultimate Education	Mission Administration	Announcement Usefulness	Public & Ecological Alarm	Personality & Group Job	Modernization and Private Enterprise	An ability to enhance the application of knowledge of theory subjects in diverse fields	Develop language proficiency to handle corporate communication demands.	Preparing students in various disciplines of technologies such as computer applications, computer networking, software engineering, JAVA, database concepts and programming	In order to enhance programming skills of the young IT professionals, the concept of project development in using the technologies learnt during the semester has been introduced	In order to enhance programming skills of the young IT professionals, the concept of project development in using the technologies learnt during the semester has been introduced
03CA333.1: Acquire the knowledge of IoT concept and its Architecture.	3	2	3	3	2	1	1	1	1	2	1	3	2	2	3	3	3
03CA333.2: Acquire the basic concept of Software defined networking and Machine-to-Machine (M2M).	2	3	3	3=2	2	2	1	2	1	2	1	3	2	3	2	3	3
03CA333.3: Exposed to various web communication Protocols for connected devices & Message communication Protocols for connected devices.	2	2	2	3	2	2	2	1	1-2	1	1	3	2	2	2	3	3
03CA333.4: Familiarize and understand the basic Sensor data Communication Protocols.	2	2	3	2	2	2	1	1	1	1	2	3	2	2	3	2	2
03CA333.5: Smart City Streetlights control & monitoring.	2	2	3	2	2	2	1	1	1	1	1	3	2	2	3	2	2

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs /*-No.	COs No.& Titles	SOs No.	Laboratory Instruction(LI)	Classroom Instruction(CI)	Self Learning(SL)
PO: 1,2,3,4,5,6,7,8, 9,10,11,12 PSO:1,2,3,4	**CT101.1:** Acquire the knowledge of IoT concept and its Architecture.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	L1.1,1.2,1.3, 1.4,1.5,1.6	**Unit-1** 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8, 1.9,1.10,1.11	As Mentioned in Page no. ____to _____
PO: 1,2,3,4,5,6,7,8 ,9,10,11,12 PSO:1,2,3,4	**CT101.2:** Acquire the basic concept of Software defined networking and Machine-to-Machine (M2M).	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5	L2.1, 2.2, 2.3, 2.4, 2.5, 2.6,	**Unit-2** 2.1, 2.2, 2.3, 2.4, 2.5, 2.6,2.7,2.8,2.9,2.10,2.11,2.12	
PO: 1,2,3,4,5,6,7,8 ,9,10,11,12 PSO:1,2,3,4	**CT101.3:** Exposed to various web communication Protocols for connected devices & Message communication Protocols for connected devices.	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5	L3.1,3.2,3.3 ,3.4,3.5,3.6,	**Unit-3** 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8, 3.9,3.10,3.11,3.12	
PO: 1,2,3,4,5,6,7,8 ,9,10,11,12 PSO:1,2,3,4	**CT101.4:** Familiarize and understand the basic Sensor data Communication Protocols.	SO4.1 SO4.2 SO4.3 SO4.4	L4.1,4.2,4.3 ,4.4,4.5,4.6	**Unit-4** 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4 8,4.9,4.10,4.11,4,1 2	
PO: 1,2,3,4,5,6,7,8 ,9,10,11,12 PSO:1,2,3,4	**CT101.5:** Smart City Streetlights control & monitoring.	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5	L5.1,5.2,5.3 ,5.4,5.5,5.6	**Unit-5** 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5 .8,5.9,5.10,5.11,5.12	

A K S University

Faculty of Computer Application and Science & Technology

Department of Computer Application and Science & Technology

Curriculum of B.Sc. (IT) [Program

(Revised as on 01 August 2023)

Semester-III

Course Code: **03CA332**

Course Title: **Optimization Techniques**

Pre-requisite: To study this course, a student must have had Certificate Course.

Rationale: The rationale behind discrete mathematics is grounded in its practical applications to computer science and related fields.

Course Outcomes:

After completion of course, students would be able to:
03CA332.1:- Formulate real life problems into linear programming problem.
03CA332.2:- Apply the simplex method to find an optimal vector for the standard linear programming problem and the corresponding dual problem.
03CA332.3:- Find optimal solution of transportation.
03CA332.4:- Formulate and solve linear programming model of two person zero sum game.
03CA332.5:- Solve nonlinear programming problems using Kuhn Tucker conditions.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours(CI+LI+SW+SL)	
Program Core (PCC)	03CA332	Optimization Techniques	4	0	2	1	7	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback teachers ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Course Code	Course Title	Scheme of Assessment (Marks)		
			Progressive Assessment (PRA)	End Semes	

			Class/Home Assignment 5 number 3 marks each (CA)	Class Test2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activityany one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	**ter Assessment (ESA)**	**Total Marks** (PRA+ ESA)
PCC	03CA332	Optimization Techniques	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL).

As the course progresses, student should show case the mastery of Session Outcomes (SOs), culminate tinging the over all achievement of Course Outcomes (COs) outer course's conclusion.

03CA332.1:- Formulate real life problems into linear programming problem.

Approximate Hours

Item	Appx. Hrs.
Cl	10
LI	0
SW	2
SL	1
Total	13

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO1.1 Understanding Basic concepts of linear programming problem. **SO1.2** Explain Simplex method		Unit-1. Linear Programming Problem **1.1** Definition of programming problem	1. Basic concepts of linear programming problem.

SO1.3 discuss Two-phase method **SO1.4** define Big-M method		**1.2** Basic concepts of linear programming problem **1.3** Simplex method **1.4** Simplex method algorithm **1.5** Artificial variables technique I **1.6** Artificial variables technique II **1.7** Two-phase method **1.8** Example of Two-phase method **1.9** Big-M method **1.10** Example of Big-M method	

SW-1: Suggested Sessional Work (SW):

a. Assignments:

i. Basic concepts of linear programming problem.
ii. Two-phase method and Big-M method.

b. Mini Project: None

c. Other Activities (Specify): Seminar

03CA332.2:- Apply the simplex method to find an optimal vector for the standard linear programming problem and the corresponding dual problem.

Approximate Hours

Item	Appx. Hrs.
Cl	10
LI	0
SW	2
SL	2
Total	14

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO2.1 Define dual problem. **SO2.2** Discuss Primal-dual relationships. **SO2.3** To learn about Dual simplex Method.		**Unit-2** :**Duality**: **(10-Lectures)** **2.1** Definition the dual problem **2.2** Example of the dual problem **2.3** Formulation of the dual problem **2.4** Primal-dual relationships I **2.5** Primal-dual relationships II **2.6** Economic interpretation of the dual I **2.7** Economic interpretation of the dual II **2.8** Dual simplex Method. **2.9** Example of Dual simplex Method. **2.10** Sensitivity analysis.	1. Primal-dual relationships. 2. Economic interpretation of the dual.

SW-2 Suggested Seasonal Work (SW):

b. Assignments:

i. Definition and formulation of the dual problem.

ii. Economic interpretation of the dual and dual simplex Method.

S2-BCAC2G.3:- Find optimal solution of transportation.

Approximate Hours

Item	Appx. Hrs.
Cl	16
LI	0
SW	2
SL	2
Total	20

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO3.1 To Understand Mathematical model **SO3.2** To learn Balanced and unbalanced problems. **SO3.3** Explain Least cost method. **SO3.4** To Understand Algorithm for solving transportation problem.		Unit-3: Transportation Problems: (16-Lectures) **3.1** Mathematical model **3.2** Balanced problems **3.3** Example of Balanced problems **3.4** Unbalanced problems **3.5** Example of Unbalanced problems **3.6** Degeneracy **3.7** Optimality conditions **3.8** Methods to find starting solution **3.9** Example of Methods to find starting solution **3.10** Methods to find optimal solution **3.11** Example of Methods to find optimal solution **3.12** Algorithm for solving transportation problem **3.13** Example of solving transportation problem **3.14** Northwest-Comer method **3.15** Least cost method **3.16** Vogel approximation method for determination of starting basic solution	3. Algorithm for solving Transportation problem. 4. Methods to find starting solution and optimal solution

SW-3 Suggested Sessional Work (SW):

a. **Assignments:**

i. Balanced and unbalanced problems.
ii. Algorithm for solving transportation problem.
iii. Methods to find starting solution and optimal solution.
iv. Vogel approximation method for determination of starting basic solution.

03CA332.4:- Formulate and solve linear programming model of two person zero sum game.

Approximate Hours

Item	Appx. Hrs.
Cl	10
LI	0
SW	2
SL	2
Total	14

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO4.1 To Understand Network Analysis. **SO4.2** To learn Critical Path Method (CPM). **SO4.3** To understand Advances of network. **SO4.4** Explain PERT calculation.		Unit-4: Network Analysis: (10-Lectures) **4.1** Constraints in network **4.2** Construction of network **4.3** Critical Path Method (CPM) **4.4** Example of Critical Path Method (CPM) **4.5** PERT calculation **4.6** Example of PERT calculation **4.7** Resource leveling by network techniques **4.8** Resource leveling by network techniques II **4.9** Advances of network (PERT) **4.10** Advances of network (CPM)	1. Critical Path Method. 2. Advances of network.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

i. Construction of network, PERT calculation.

ii. Resource leveling by network techniques, Advances of network (PERT/CPM).

03CA332.5:- Solve nonlinear programming problems using Kuhn Tucker conditions.

Approximate Hours

Item	Appx. Hrs.
Cl	14
LI	0
SW	2
SL	2
Total	18

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO5.1 To understand Game Theory. **SO5.2** To learn about Games with mixed strategies. **SO5.3** Explain Kuhn-Tucker conditions. **SO5.4** define Non-negative constraints.		**Unit 5** **Game Theory: (14-Lectures)** **5.I** Formulation of two person zero sum games **5.2** Solving two person zero sum games **5.3** Games with mixed strategies **5.4** Graphical solution procedure I **5.5** Graphical solution procedure II **5.6** Linear programming solution of games **5.7** Example of Linear programming solution of games **5.8** Non-Linear programming techniques **5.10** Example of Non-Linear programming techniques **5.11** Kuhn-Tucker conditions **5.12** Example of Kuhn-Tucker conditions **5.13** Non-negative constraints **5.14** Example of Non-negative constraints	1. Formulation of two person zero sum games. 2. Linear programming solution of games

SW-5 Suggested Sessional Work (SW):

b. Assignments:

i. Formulation of two person zero sum games, Solving two person zero sum games.
ii. Linear programming solution of games.
iii. Non-Linear programming techniques and Kuhn-Tucker conditions.

Brief of Hours suggested for the Course Outcome

Course Out comes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
03CA332.1:- Formulate real life problems into linear programming problem.	10	02	01	13
03CA332.2:- Apply the simplex method to find an optimal vector for the standard linear programming problem and the corresponding dual Problem.	10	02	02	14
03CA332.3:- Find optimal solution of transportation.	16	02	02	20
03CA332.4:- Formulate and solve linear programming model of two-person zero sum game.	10	02	02	14
03CA332.5:- Solve nonlinear programming problems using Kuhn Tucker conditions.	14	02	02	18
Total Hours	60	10	09	79

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	

CO-1	Linear Programming Problem	03	02	03	08
CO-2	Duality	03	01	05	09
CO-3	Transportation Problems	03	07	02	12
CO-4	Network Analysis	03	05	05	13
CO-5	Game Theory	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

The end-of-semester assessment for Introduction to Optimization Techniques will be held with a written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above Tasks. Teachers can also design different tasks as per requirement, for end semester Assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to software industry
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

B. *Books:*

S. No.	Title	Author	Publisher	Edition &Year
1	Linear Programming and Network Flows.	Mokhtar S. Bazaraa, John J. Jarvis and Hanif D.	John Wiley and Sons, India,	2nd Ed. 2004

		Sherali.		
2	Introduction to Operations Research,	F.S. Hillier and G.J. Lieberman	Tata McGraw Hill, Singapore	9th Ed 2009
3	Operations Research	Nita H. Shah, Ravi M. Gur and Hardik Soni	PHI Learning Pvt. Ltd.	2007

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16. Ms. Pushpa Kushwaha, Assistant Professor, Department of Computer Science and Engineering.

CO, PO and PSO Mapping

Program: B.SC. (IT)
Course Code: 03CA332
Course Title: Optimization Techniques

Course Outcomes	Program Outcomes												Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
	Engineering knowledge	Problem Analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	
CO 1	2	2	3	3	2	1	1	1	1	1	1	3	2	2	3	2	3
CO 2	2	3	2	3	2	2	1	1	1	1	1	3	2	3	2	3	3
CO 3	2	2	2	3	2	2	1	1	1	1	1	3	2	2	2	2	3
CO 4	2	2	3	2	2	2	1	1	1	1	1	3	2	2	3	2	2
CO 5	2	2	3	2	2	2	1	1	1	1	1	3	2	2	3	2	2

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map:

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self learning (SL)
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: Formulate real life problems into Linear programming problem.	SO1.1 SO1.2 SO1.3 SO1.4		Unit-1 Linear Programming Problem 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9.1.10,	As mentioned above
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO2: Apply the simplex method to find an optimal vector for the standard linear programming problem and the Corresponding dual problem.	SO2.1 SO2.2 SO2.3		Unit-2 Duality 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8,2.9,2.10	
PO 1,2,3,4,5,6 7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3: Find optimal solution of Transportation.	SO3.1 SO3.2 SO3.3 SO3.4		Unit-3 : Transportation Problems 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,3.10, 3.11,3.12,3.13,3.14,3.15,3.16	
PO 1,2,3,4,5,6 7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO4: Formulate and solve linear Programming model of two person zero sum game.	SO4.1 SO4.2 SO4.3 SO4.4		Unit-4: Network Analysis 4.1, 4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10	
PO 1,2,3,4,5,6 7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO5: Solve nonlinear programming problems using Kuhn Tucker conditions	SO5.1 SO5.2 SO5.3 SO5.4		Unit-5: Game Theory 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10 5.11,5.12,5.13,5.14	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application& Information Technology

Curriculum of BSC (IT) (Bachelor of Science)

(Revised as on 01 August 2023)

Semester-IV

Course Code: 0EN401

Course Title: Entrepreneurship Development

Pre-requisite: Student should have basic knowledge of computer

Rationale: Computer ethics is essential because it guides ethical behavior in the digital age, addresses ethical dilemmas in technology use, and promotes the responsible and ethical development, deployment, and use of technology for the benefit of individuals and society as a whole.

Course Outcomes:

0EN401.1: student will Advance their skills in customer development, customer validation, competitive Analysis, and iteration while utilizing design thinking and process tools to evaluate in real-world Problems and projects.

0EN401.2: Mobilize people and resources

0EN401.3: Increase their awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency.

0EN401.4: Demonstrate knowledge of current information, theories and models, and techniques and practices in all of the major business disciplines including the general areas of Accounting and Finance, Information Technologies, Management, Marketing, and Quantitative Analysis.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Skill Enhancement	0EN401	Entrepreneurship Development	2	0	2	1	5	2

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performance laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Cous e Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment	Total Marks
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	(ESA)	(PRA+ ESA)
SE	0EN401	Entrepreneurship Development	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

0EN401.1: Advance their skills in customer development, customer validation, competitive analysis, and iteration while utilizing design thinking and process tools to evaluate in real-world problems and projects.

Approximate Hours

Item	Appx Hrs
Cl	6
LI	0
SW	2
SL	1
Total	9

Session Outcomes(SOs)	Laboratory Instruction	Classroom Instruction(CI)	Self-Learning(SL)

	(LI)		
SO1.1To understand the Theories of Entrepreneurship SO1.2 Explain Categories of Entrepreneurship SO1.3 To Know the challenges and process of Entrepreneurship SO1.4 Explain Startups and its types .		**Unit-1** 1. Introduction Entrepreneurship 2. Theories of Entrepreneurship 3. Theory of Achievement Motivation 4. And Theory of Entrepreneur as a risk taker 5. Theory of Creative destruction 6. Entrepreneurship Categories: by chance, need choice, force; Myths. 7. challenges and process of Entrepreneurship 8. Definition of Startups and types of Internet-based startups	1. Learn Internet based startups

SW-1 Suggested Sessional Work (SW):

- **Assignments:**
  - Discuss about Entrepreneurship Categories: by chance, need choice, force; Myths
- **Presentation**

0EN401.**2:** Mobilize people and resources

Approximate Hours

Item	Appx Hrs
Cl	6
LI	0
SW	2

SL	1
Total	07

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO2.1 To Understand the Difference between Scientist, Entrepreneur, and Manager. **SO2.2** Difference between idea and opportunity SO2.3 To understand Link between creativity and innovation SO2.4 To know Types of innovation		**Unit-2** **1.** Difference between Scientist, Entrepreneur, and Manager. **2.** Characteristics of Entrepreneur ,Entrepreneurial Mindset and its enablers **3.** Difference between idea and opportunity **4.** Link between creativity and innovation 5. character of creative climate with cases of world most creative companies 6. Types of innovation, link between Technology and innovation.	1. Learn about the link between technology and innovation.

SW-2 Suggested Seasonal Work (SW):

- **Assignments:**
  - Discuss Link between creativity and innovation
- Pictorial representation of different character of creative climate**?**

0EN401**.3**: Increase their awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency.

Approximate Hours

Item	Appx Hrs
Cl	4

LI	0
SW	2
SL	1
Total	7

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO3.1 To understand Opportunity Analysis SO3.2know Opportunity Evaluation Process SO3.3 Develop Idea to Opportunity Mapping SO3.4 To understand Business Model		**Unit-3:** 1. Opportunity Analysis 2. Opportunity sighting 3. Market Driven, People Driven 4. Opportunity Evaluation Process 5. Approaches to ideation, Ideation techniques 6. Idea to Opportunity Mapping 7. Business Model – Functions and Factors of Business Model	**1.** learn Functions and Factors of Business Model

SW-2 Suggested Seasonal Work (SW):

- **Assignments:**
  - Explain Opportunity sighting, Opportunity sighting
- **Presentation**

0EN401**.4:** Demonstrate knowledge of current information, theories and models, and techniques and practices in all of the major business disciplines including the general areas of Accounting and Finance, Information Technologies, Management, Marketing, and Quantitative Analysis.

Approximate Hours

Item	Appx Hrs
Cl	6
LI	0
SW	2
SL	1
Total	9

Session Out comes(SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO4.1 To Understand Pitching, types of pitch **SO4.2** To understand Aspects of funds, types of capital, **SO4.3** Explain the types and nature of investors **SO4.4** To understand the three financial statements **SO4.5** To Understand Business Plan its types and different sections.	.	**Unit-4: MEMORY SYSTEM:** 4.1 Introduction to Pitching, types of pitch 4.2 Aspects of funds, types of capital, concept of break-even, sources of funds 4.3 types and nature of investors, 4.4 Understanding of the three financial statements: 4.5 Profit and loss account, balance sheet, cash flow statement. 4.6 Introduction to Business Plan its types And different sections.	1. Prepare a Business Plan

SW-4 Suggested Seasonal Work (SW):

- **Assignments:**
- **(i)** Write the process of break-even
- **Presentation**

0EN401.5**:** At the end of this chapter the student will Increase their awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency.

Approximate Hours

Item	Appx Hrs

Cl	6
LI	0
SW	2
SL	1
Total	9

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO5.1 To understand collaboration **SO5.2** To understand networking **SO5.3** To know about Distinction between data, information, intelligence and knowledge **SO5.4 To** Understand Intellectual Property		**Unit5:** 1. Why Collaborate, types and approaches of collaboration 2. Why Network: places of networking 3. Networking: stages of networking, good networking practices 4. Distinction between data, information, intelligence and knowledge 5. Components of Knowledge 6. Intellectual Property: Its life Cycle.	1. Learn life cycle Intellectual Property

SW-5 Suggested Seasonal Work (SW):

- **Assignments:**
  - Explain in detail about Networking: stages of networking, good networking practices
- **Presentation:**
- **Other Activities (Specify):**
  - Group discussion of important topics.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour(Cl+SW+Sl)
0EN401.1 At the end of this chapter the student will Advance their skills in customer development, customer validation, competitive analysis, and iteration while utilizing design thinking and process tools to evaluate in real-world problems and projects	6	2	1	**9**
0EN401.2 At the end of this chapter the student will Mobilize people and resources	6	2	1	**9**
0EN401.3 At the end of this chapter the student will Increase their awareness and deliberately practice the skills and disciplines necessary to increase Confidence and agency.	6	2	1	**9**
0EN401.4 At the end of this chapter the student will Demonstrate knowledge of current information, theories and models, and techniques and practices in all of the major business disciplines including the general areas of Accounting and Finance, Information Technologies, Management, Marketing, and Quantitative Analysis.	6	2	1	**9**
0EN401.4 At the end of this chapter the student will Increase their awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency.	6	2	1	**9**
Total Hours	30	10	5	45

Suggestion for End Semester Assessment

Suggested Specification Table (ForESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Unit-1	03	02	03	08
CO-2	Unit-2	03	01	05	09
CO-3	Unit-3	03	07	02	12
CO-4	Unit-4	03	05	05	13
CO-5	Unit-5	03	02	03	08
Total		**15**	**17**	**18**	**50**

Legend: R: Remember, U: Understand, A: Apply

The end-of-semester assessment for autonomous system for AI and DS will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers Can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
8. Brainstorming

Suggested Learning Resources:

A. Books:

S. No.	Title	Author	Publisher	Edition & Year
1	Computer Ethics	John Weckert	The Internal Library of essays	2007
2	The Handbook of Information and Computer Ethics ,	Kenneth Einar Himma PhD, JD,, Herman T. Tavani PhD	John Wiley & Sons, Inc.	2008

B. Alternative NPTEL/SWAYAM/MOOC Course (if any): NA

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8. Ms. Pushpa Kushwaha, Assistant Professor, Department of Computer Science and Engineering.

COs, POs and PSOs Mapping

Course Title: B.Sc.(IT)
Course Code: 0EN401
Course Title: Entrepreneurship Development

Course Outcomes	Program Outcomes											Program Specific Outcome				
	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer- based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO1. At the end of this chapter the student will Advance their skills in customer development, customer validation, competitive analysis, and iteration while utilizing design thinking and process	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2

tools to evaluate in real-world problems and projects																	
CO2.At the end of this chapter the student will Mobilize people and resources	**1**	**1**	**2**	**2**	**1**	**2**	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**3**
CO3. At the end of this chapter the student will Increase their awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency.	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**1**	**2**	**3**	**3**	**3**	**3**	**2**	**2**
CO4 At the end of this chapter the student will Demonstrate knowledge of current information, theories and models, and techniques and practices in all of the major business disciplines including the general areas of Accounting and Finance, Information Technologies, Management, Marketing, and Quantitative Analysis.	-	-	-	**1**	**1**	**3**	**3**	**3**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**3**	**3**

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO1.At the end of this chapter the student will Advance their skills in customer development, customer validation, competitive analysis, and iteration while utilizing design thinking and process tools to evaluate in real-world problems and projects	SO1.1 SO1.2 SO1.3 SO1.4		1. Unit-1 Introduction Entrepreneurship 1.1,1.2,1.3,1.4,1.5,1.6,1.7	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO2At the end of this chapter the student will Mobilize people and resources	SO2.1 SO2.2 SO2.3 SO2.4		Unit-2 Difference between Scientist 2.1, 2.2, 2.3, 2.4, 2.5, 2.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO3**At the end of this chapter the student will Increase their awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency.	SO3.1 SO3.2 SO3.3 SO3.4		Unit-3 Opportunity Analysis 3.1,3.2,3.3,3.4,3.5,3.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO4**At the end of this chapter the student will Demonstrate knowledge of current information, theories and models, and techniques and practices in all of the major business disciplines including the general areas of Accounting and Finance, Information Technologies, Management, Marketing, and Quantitative Analysis.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5		Unit-4 Introduction to Pitching 4.1,4.2,4.3,4.4,4.5,4.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO5**At the end of this chapter the student will Increase their awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency.	SO5.1 SO5.2 SO5.3 SO5.4		1. Unit-5 Why Collaborate, types and approaches of collaboration 5.1,5.2,5.3,5.4,5.5,5.6	

A K S University

Faculty of Engineering and Technology

Department of Computer Science & Engineering

Curriculum of B.Tech. (Computer Science & Engineering) **Program**

(Revised as on 01 August 2023)

Semester-IV

Course Code: 0CA402

Course Title: Minor Project

Pre- requisite: Student should have knowledge of programming languages, Software Engineering, and Many more tools and framework.

Rationale:

- To apply the knowledge and skills learnt in previous semesters, to solve real life industrial / engineering / professional problems.
- To modify/ improve the existing engineering / professional systems.
- To develop systems / components / methods / processes / resources to cater the needs of the nearby small scale / medium industry.
- To learn to solve real life engineering / professional problems which often have many aspects to be considered and addressed.

Course Outcomes:

0CA402.1: - The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.
0CA402.2: - The student will be able to implement the project plan and manage the project.
0CA402.3: - The student will be able to present the completed project work.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Project	0CA402	Minor Project	0	4	0	0	4	2

The Course on Project Work consists of five phases: -

	Description of phases	Learn Hrs.
1	Literature / industry's need survey and finalization of topic / title	15 Hrs
2	Detailed planning of the project work	
3	Implementing the detailed project plan	60 Hrs
4	Managing the project activities	
5	Reporting of the project work output/outcome / prototype	15 Hrs
	Total	90 Hrs

General Guidelines for Project Work

- The project topics should be related to concerned branch of engineering / profession, but should not be the exact content of the curriculum taughtin the discipline.
- Student's project topics should be preferably 'real life' topics. It means the project topics should have substantial element of uncertainty, complexity and multi-disciplinary-ness which can be coped up by the students. These elements offer opportunities to students to apply engineering/ professional knowledge in real life settings, solve real life problems and to take real life decisions. As a project guide, concerned teacher should ensure these by suitably altering / framing / reframing the statement of topic / title.
- The project topics should be such that students can get opportunity to refer IS codes, Manuals, Handbooks, norms and standards, opportunity to conduct standard tests, and opportunity to operate modern laboratory equipment's following SOPs.
- For student's interest, active participation and ownership in the project work, their self-motivation is necessary. Therefore, students should be actively involved in finalizing the topic of project.
- Students should be asked to conduct a brief review of literature for problems and issues in their engineering / professional areas of interest, where they think they can contribute effectively. The project guide should facilitate them in this regard, through his/her expertise and experience.
- Every student group should be asked to propose at least three topics oftheir interest. The topics proposed by student project groups should be assessed bythe facilitator-teacher on following three criteria: -
    - **The work on the topic should be theoretically and practically feasible.**
    - **The project work on the topic should be completed within approx. Three and half months.**
    - **Availability of required resources should be certain. Cost of project work should also be bearable.**
- Normally, students' project works should be carried out in small groups (1 to 2 students).
- All faculty members of department should be engaged as project guides. Every faculty member should be project guide of at least one student project group.
- Normally, project guides should be assigned to the students through lottery system and students under each faculty should be asked to formtheir small groups.

COs, POs and PSOs Mapping

Course Title: BSc IT
Course Code: 0CA402
Course Title: Minor Project

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1: The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.	2	3	3	2	3	2	3	1	3	1	3	3	2	3	3	1	2
CO 2: The student will be able to implement the project plan and manage the project.	2	3	3	2	3	2	3	1	3	1	3	3	2	2	2	2	3
CO 3: The student will be able to present the completed project work.	2	2	3	1	3	2	2	1	3	1	3	3	2	3	2	2	2

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.	-	-	-	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: The student will be able to implement the project plan and manage the project.	-	-	-	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 3: The student will be able to present the completed project work.	-	-	-	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application& Information Technology

Curriculum of BSC (IT) (Bachelor of Science)

(Revised as on 01 August 2023)

Semester-IV

Course Code: **02CA421**

Course Title: **Internet Applications using Java Programming**

Pre-requisite: Student should have a basic understanding of Fundamental of Computer.

Rationale: The study of this subject will develop understanding of Java core concepts. Java is an object-oriented language that is best suited for Internet applications. All these concepts will help students to develop elementary internet applications using JAVA that solve real world problems.

Course Outcomes:

02CA4211: Able to use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.

02CA421.2: Understand and apply the concepts of Inheritance and Interfaces.

02CA421.3: Learn and apply applet programming to create basic web pages.

02CA421.4: Understand the Java event handling model and apply to create interactive web pages.

02CA421.5: Able to implement I/O operations and connect to database to solve real world problems.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Minor	**02CA421**	Internet Applications using Java Programming	4	4	1	1	10	6

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e., Lecture (L) and Tutorial (T) and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, and mini projected.),

SL: Self-Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback teachers ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one	Class Attendance	Total Marks (CA+CT+SA+		
Minor	**02CA421**	Internet Applications using Java Programming	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

02CA421.1: Able to use an integrated development environment to write, compile, run, and testsimple object-oriented Java programs.

Approximate Hours

Item	Appx. Hrs.
CI	15
LI	12
SW	1
SL	1
Total	29

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO1.1 Understand about language and programming paradigm **SO1.2** Understand OOPs concept, how java works. **SO1.3** Understand the concept of PATH and CLASS PATH **SO1.4** Learn about structure, compilation and execution of a Java program and role of JVM **SO1.5** Learn about data sets, operators and expressions **SO1.6** Learn about operators and expressions. **SO1.7** Learn about decision control statements and looping statements. **SO1.8** Understand the Concepts of Classes. **SO1.9** Learn to create Objects and methods **SO1.10** Understand the concepts of Constructor **SO1.11** Understand Memory allocation and garbage	1. Write a program to print numbers in words using Nested if and Switch Case. 2. Write a program called PassFail which prints "PASS" if the int variable "mark" is more than or equal to 50; or prints "FAIL" otherwise 3. Write a program called OddEven which prints "Odd Number" if the int variable "number" is odd, or "Even Number" otherwise. 4. Write a Program to find sum & average of 10 no. using arrays. 5. WAP to demonstrate looping statement. 6. WAP to demonstrate classes in java.	**Unit-1.0 The Java Environment** 1.1 History and features of java, C++ Vs java. 1.2 OOPs concept, how java works. 1.3 The concept of PATH and CLASS PATH. 1.4 A simple program, its compilation and execution, JAVA Program Structure, Java Virtual Machine concepts 1.5 Java platform overview, Primitive data types, variables and constants. 1.6 Operators, expression. 1.7 Statement-branching, looping and jumping, labeled statements. 1.8 Classes, objects and methods: defining a class, adding variables and methods. 1.9 Creating objects, constructor 1.10 Instances, field and methods initialization by constructors, Copy constructor,	1. Use of algorithms for develop program. 2. Create program in Java use of decision and looping statement.

collection in java **SO1.12** Learn about Keywords. **SO1.13** Learn about arrays **SO1.14** Learn about String and String buffer classes **SO1.15** Learn about Wrapper classes, using the JDK Tools.		1.11 Memory allocation and garbage collection in java. 1.12 Java keywords, access methods 1.13 Arrays 1.14 String and String buffer classes. 1.15 Wrapper classes, using the JDK tools.	

SW-1 Suggested Sessional Work (SW):

a. Assignments:

1. Create a program in Java to check the input no is prime or not.
2. Create a program in Java to print a factorial of given no.

b. Mini Project:

Java Program to Make a Simple Calculator using switch...case.

c. Other Activities (Specify):

NA

02CA421.2: Understand and apply the concepts of Inheritance and Interfaces.

Approximate Hours

Item	Appx. Hrs.
CI	11
LI	12
SW	1
SL	1
Total	25

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**

SO2.1 Understand about Inheritance. **SO2.2** Learn about method overloading **SO2.3** Learn about abstract classes. **SO2.4** About Interface and implementing an interface **SO2.5** Create programs implementing an Interface **SO2.6** Learn about Multithreading. **SO2.7** Understand the lifecycle of a thread. **SO2.8** Learn creating a thread **SO2.9** Learn thread Synchronization. **SO2.10** Understand Thread scheduling. **SO2.11** Learn exception handling.	2.1 Write a program to display reverse ofa digit no. using array. 2.2 Write a program to display grade according to themarks obtained by the student. 2.3 Find the factorial of number if numberis given by user using command line argument. 2.4 Write a program to print Fibonacci series. 2.5 WAP to demonstrate thread. 2.6 WAP to demonstrate exception handling.	**Unit-2.0 Inheritance and Interfaces** 2.1 Inheritance basics, Super class, Sub-class. 2.2 Method overloading 2.3 Abstract classes. 2.4 Defining an interface, implementing & applying interfaces, variables in interfaces 2.5 Create programs implementing an Interface 2.6 Extending interfaces, Multithreading and Exception Handling: Basic idea of multithreaded programming 2.7 The lifecycle of a thread 2.8 Creating thread with the thread class and runnable interface. 2.9 Thread synchronization 2.10 Thread scheduling 2.11 Basic idea of exception handling: The try, catch and throw, throws	1. Study and practice implementing interfaces. 2. Study exception handling.

SW-2 Suggested Sessional Work (SW):

a. Assignments:
1. Write a program in Java to show method overloading.
2. Write a program in Java implementing the concept of multi-threading.

b. Mini Project:
NA

c. Other Activities (Specify):
NA

02CA421.3: Learn and apply applet programming to create basic web pages.

Approximate Hours

Item	Appx. Hrs.
CI	11
LI	12
SW	1
SL	1
Total	25

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
O3.1 Learn about Applets. **SO3.2** Learn creating applets. **SO3.3** Understand applets And alignment. **SO3.4** Understand Java security, passing parameter to applets, Aligning the Display **SO3.5** Learn basic HTML Tags **SO3.6** Learn how to take Inputs from the user. **SO3.7** Understand class Hierarchy and basic user interface components. **SO3.8** Understand basic user interface components. **SO3.9** Understand basic user interface components. **SO3.10** Understand various types of layouts. **SO3.11** Understand various Types of layouts.	3.1 Write a program to display tables from 2 to10. 3.2 Write a program to take an input from user and check given number isprime or not. 3.3 Write a programto implement method overriding. 3.4 Write a programto convert given string into. Uppercase and lowercase and get the length of string using array 3.5 WAP to demonstrate HTML tags. 3.6 WAP to demonstrate Applet tags.	**Unit-3.0 Applet Programming** 3.1 Local and Remote Applets, Applet Vs Application 3.2 Creating and executing java applets 3.3 Inserting applets in a web page 3.4 Java security, passing parameter to applets, Aligning the Display 3.5 HTML Tags & Applet Tag 3.6 Getting Input from User 3.7 The class hierarchy of window fundamentals; The basic user interface components Label, Button 3.8 Check Box, Radio Button 3.9 Choice menu, Text area, scroll list, Scroll bar 3.10 Frame, Layout managers-flow layout 3.11 Grid layout, Border layout, Card layout	1. Study About Applet. 2. Create Web pages using applets.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Create a web page using applets?
2. Differentiate between Local and Remote applets?

b. Mini Project:
Create the homepage and Contact Us page for the University website.

c. Other Activities (Specify):
NA

02CA421.4: Understand the Java event handling model and apply to create interactive web pages.

Approximate Hours

Item	Appx. Hrs.
CI	13
LI	12
SW	1
SL	1
Total	27

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Understand the basic Concepts of Event handling model in Java. **SO4.2** Understand the basic concepts of Event handling model in Java. **SO4.3** Learn about event Class hierarchy. **SO4.4** Learn about event Class hierarchy. **SO4.5** Learn about Adapter classes, Event classes, action Event. **SO4.6** Understand about various types of	4.1 Write a programto overload volume method to find out volume of cube and cuboid. 4.2 Write a programto design a class using abstract Methods and Classes. 4.3 Write a programto implement multiple inheritance by using Interface. 4.4 Write a programto create a package of your name and use that package in a class 4.5 WAP to demonstrate interface. 4.6 WAp to demonstrate event handling.	**Unit-4.0 The Java Event Handling Model** 4.1 Java's event delegation model ignoring the event 4.2 Self- contained events, Delegating events 4.3 The event class hierarchy 4.4 The relationship between interface, methods called, parameters and event source 4.5 Adapter classes, Event classes, action Event 4.6 Adjustment Event, Container Event 4.7 Focus Event, Item Event 4.8 Event, Mouse Event	1. Study about Event Handling in Java.

Events supported by Java. **SO4.7** Understand about Various types of Events supported by Java. **SO4.8** Understand about Various types of Events supported by Java. **SO4.9** Understand about Various types of Events supported by Java. **SO4.10** Learn about basics of networking. **SO4.11** Learn about Networking related Java classes. **SO4.12** Learn about TCP/IP and datagram programming. **SO4.13** Learn about TCP/IP and Datagram programming.		4.9 Text Event, Window Event 4.10 Networking basics 4.11 Networking classes and interfaces 4.12 Using java.net package 4.13 TCP/IP and datagram programming	

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Implement event handling using Java.
2. Give brief overview of TCP/IP and explain some of the events supported by Java.

b. Mini Project:

NA

c. Other Activities (Specify):

NA.

02CA421.5: Able to implement I/O operations and connect to database to solve real worldproblems.

Approximate Hour

Item	Appx. Hrs.
CI	10
LI	12
SW	1
SL	1
Total	24

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO5.1 Learn about Java i/o, **SO5.2** Learn about Directories, Stream classes. **SO5.3** Understand Byte Stream. **SO5.4** Learn about Input and Output stream. **SO5.5** Learn to access files. **SO5.6** Learn about buffered Reader and writer. **SO5.7** Understand database Connectivity. **SO5.8** Understand database Connectivity. **SO5.9** Learn about JDBC and its Classes. **SO5.10** Learn about JDBC and Its classes.	5.1 Write a program to implement parameterized constructor with default argument. 5.2 Define an exception called "Marks out of Bound" exception that is thrown if theentered marks are greater than 100. 5.3 Develop a simple real life application to illustrate the use of multithreading. 5.4 Design an applet that takes three numerical values as input from the user and then Displays the largest of those three numbers on	**Unit-5.0 Input/output and JDBC** 5.1 Exploring Java i/o. 5.2 Directories, stream classes. 5.3 The Byte Stream: Input stream, output stream 5.4 file input stream, file output stream, print stream 5.5 Random access file, the character streams 5.6 Buffered reader, buffered writer, print writer, serialization 5.7 JDBC-ODBC bridge, The connectivity model; The driver manager 5.8 Navigating the result set object contents 5.9 java.sql Package, The JDBC exception classes 5.10 Connecting to Remote database	1. Study about JDBC and SQL/PL.

	the screen. 5.5 WAP to demonstrate JDBC. 5.6 WAP to demonstrate connecting remote database.		

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Explain JDBC architecture.
2. Describe how files accessed using Java are.

b. Mini Project:
Create the login page and validate the credentials using database

c. Other Activities (Specify):
NA.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	LI (Laboratory Instruction)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
02CA421.1: Able to use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.	15	12	1	1	26
02CA421.2: Understand andapply the concepts of Inheritance and Interfaces.	11	12	1	1	25
02CA421.3: Learn and apply applet programming to create basic web pages.	11	12	1	1	25

02CA421.4: Understand theJava event handling model and apply to create interactive webpages.	13	12	1	1	27
02CA421.5: Able to implementI/O operations and connect to database to solve real world problems.	10	12	1	1	24
Total Hours	60	60	5	5	130

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
02CA421.1	The Java Environment	02	05	01	08
02CA421.2	Inheritance and Interfaces	02	03	05	10
02CA421.3	Applet programming	02	03	07	12
02CA421.4	The Java Event Handling Model	1	3	7	10
02CA421.5	Input/output and JDBC	1	05	05	10
Total		13	26	13	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Internet Applications using Java Programming will be held with written examination of 50 marks.

Suggested Learning Resources:

a. Books:

S. No.	Title	Author	Publisher	Edition &Year
1	The Complete Reference Java 2	Naughton & Schildt	Tata McGraw Hill	

2	Core Java 2 (Vol I & II),	Horstmann & Cornell Tom M. Mitchell	Sun Microsystems	
3	Java 2.0	Ivan Bayross	BPB publications	
4	Beginning Java 2, JDK	Ivor Horton's	M.P. Granth Academy, Bhopal	5th edition
5	Java- How to Program	Deitel	Pearson Education, Asia	

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COs, POs and PSOs Mapping

Program: B.SC.(IT)
Course Code : 02CA421
Course Title: Internet Applications using Java Programming

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in rea life, then offer creative software solutions with the help of AI and Data Science Technologies
CO 1: Able to use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.	2	2	3	3	3	1	1	1	1	1	1	3	2	3	3	1	2
CO 2: Understand and apply the concepts of Inheritance and Interfaces.	1	3	2	3	2	2	2	1	1	1	1	3	2	2	2	1	3
CO3: Learn and apply applet programming to create basic web pages.	2	2	2	3	3	2	1	1	1	1	1	3	1	1	2	2	2
CO 4: Understand the Java event handling model and apply to create interactive web pages.	1	2	3	2	3	2	1	1	1	2	1	3	3	3	3	2	2
CO 5: Able to implement I/O operations and connect to database to solve real world problems.	1	2	2	3	3	1	1	2	1	2	1	3	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO1 At the end of this chapter the student will Advance their skills in customer development, customer validation, competitive analysis, and iteration while utilizing design thinking and process tools to evaluate in real-world problems and projects	SO1.1 SO1.2 SO1.3 SO1.4		Unit-1 The Java Environment 1.1,1.2,1.3,1.4,1.5,1.6,1.7	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO2 At the end of this chapter the student will Mobilize people and resources	SO2.1 SO2.2 SO2.3 SO2.4		Unit-2 Inheritance and Interfaces 2.1, 2.2, 2.3, 2.4, 2.5, 2.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO3** At the end of this chapter the student will Increase their awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency.	SO3.1 SO3.2 SO3.3 SO3.4		Unit-3 Applet programming 3.1,3.2,3.3,3.4,3.5,3.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**O4** At the end of this chapter the student will Demonstrate knowledge of current information, theories and models, and techniques and practices in all of the major business disciplines including the general areas of Accounting and Finance, Information Technologies, Management, Marketing, and Quantitative Analysis.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5		Unit-4 The Java Event Handling Model 4.1,4.2,4.3,4.4,4.5,4.6	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	**CO5** At the end of this chapter the student will Increase their awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency.	SO5.1 SO5.2 SO5.3 SO5.4		Unit-5 Input/output and JDBC I5.1,5.2,5.3,5.4,5.5,5.6	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application& Information Technology

Curriculum of BSC (IT) (Bachelor of Science)

(Revised as on 01 August 2023)

Semester-IV

Course Code: **01CA411**

Course Title: **Database Management Systems Using PL/SQL**

Pre-requisite: **Student should have basic knowledge of components and architecture of digital computer system**

Rationale: The students should possess foundational understanding about the basic components of Digital Computer system. This encompasses familiarity with the operational elements of Digital computer system. Additionally, Students ought to acquire fundamental insights into different types of computers, their applications.

Course Outcomes:

01CA411.1: Explain the Features of Database Management Systems and Relational Database.

01CA411.2: Design Conceptual Models of a Database Using ER Modelling for Real Life Applications and Construct Queries in Relational Algebra.

01CA411.3: Create and Populate A RDBMS for A Real-Life Application, With Constraints and Keys, Using SQL

01CA411.4: Retrieve Any Type of Information from A Database by Formulating Complex Queries In SQL. 01CA411.5 Analyses the Existing Design of a Database Schema and Apply Concepts of Normalization to Design an Optimal Database.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Major	01CA411	Database Management Systems Using PL/SQL	4	4	1	1	10	6

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) And others),
LI: Laboratory Instruction (Includes Practical performance laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA +ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
Major	01CA411	Computer Organization	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

01CA411.1: **Explain The Features Of Database Management Systems And Relational Database.**

Item	Appx. Hrs.
Cl	13
LI	12
SW	1
SL	1
Total	27

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO1.1 Define DBMS Discuss about the Characteristics. **SO1.2 Explain** Architecture and Modeling **SO1.3Explain**1 Entity Relationship (ER) Model	1.1 draw ER Model and Relational Model for a given database. 1.2 Show ER to	**Unit-1. Introduction to DBMS:** 1.4 Why database? Characteristics of data in database Functional Units. 1.5 What are database advantages of DBMS? 1.6 Conceptual, physical and logical database models. 1.7 Role of DBA, Database	1. Why we Are using database. And how much its important .
SO1.4 Enhanced Entity Relationship (EER) Model **SO1.**5 **Explain** Generalization	Relational Model Reduction. 1.3 Create a table using select Command. 1.5 Delete a table. 1.6 Draw ER diagram of the Shopping Mall. 1.7 Write DDL commands.	design 1.8 Components of ER-model, ER modeling symbols. 1.9 Relationships. 1.10 An introduction, Superclass and subclass entity types. 1.11 Specialization, Generalization. 1.12 Attribute Inheritance, Categorization & Aggregation. 1.13 DBMS, DBA, Entity Relationship (ER) 1.14 S EER, Superclass 1.15 Subclass, Specialization Floating-Point Representation 1.16 Generalization, Categorization & Aggregation.	

SW-1Suggested Sessional Work (SW):

a. Assignments:

(i) Explain Components of ER-model and ER modeling symbols.

b. Presentation.

c. Pictorial representation of ER-Model:

01CA411.2: **Design Conceptual Models Of A Database Using ER Modelling For Real Life Applications And Construct Queries In Relational Algebra.**

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Approximate Hours

Item	Appx. Hrs.
Cl	11
LI	12
SW	1
SL	1
Total	25

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO2.1 Fundamental Concepts. **SO2.2** To learn Normalization Process **SO2.3**To understand Transforming a Conceptual Model to a Relational Model. **SO2.4** Transforming Relationships. **SO2.**5 Aggregated Object Sets.	1) Creation of Database with proper constraints (Pk, Fk etc). 2) Insert into database using different types of insert statements. 3) To display the table after creation and insertion we use the following syntax: select *front <table nanze> 4) Display the DML commands. 5) Demonstrate the normaliaztion. 6) Demonstrate the use of primary	Unit-2 The Relational Data Model **2.1** Relations, Null Values, **2.2** Keys, Foreign Keys. **2.3** Integrity Constraints Entity Integrity & Relational Integrity. **2.4** First Normal Form, Functional Dependencies, Second Normal Form, Third Normal Form. **2.6** Boyce-Codd Normal Form (BCNF), Fourth Normal Form; Other Normal Forms Fifth Normal Form & Domain/Key Normal Form. **2.7** Transforming Objects Sets and Attributes **2.8** Transforming Models without External Keys. **2.9** Transforming Specialization and Generalization Object Sets. **2.10** One-One Relationships.	1. Solve Recursive Relationship.

	key.		

SW-2 Suggested Seasonal Work (SW):

a. Assignments:

(i) Design BCNF

b. Presentation

c. Pictorial representation of different type of Keys:

01CA411**.3: Create and Populate A RDBMS For A Real-Life Application, With Constraints And Keys, Using SQL**

Approximate Hours

Item	Appx. Hrs.
Cl	11
LI	12
SW	1
SL	1
Total	25

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO3. 1 Relational Algebra and Calculus Relational Algebra. SO3.2 to understand Relational Calculus. SO3.3 to understand the The Existential Quantifier	1. Applying different constraints check, not Null, etc. 2. Alter table: add column, remove column, add constraint, remove constraint 3. Demo nstrate Union. 4. Demo nstarte Interscetion .5. Demonstrat e project 6. Demonstra te theta join.	Unit-3: Relational database implementation: 3.1. Union, 3.2. Intersection 3.3. Product, 3.4. Select, 3.5. Project, 3.6. Join Natural, 3.7. Theta & Outer Join 3.8. Divide, Assignment. 3.9. Target list & Qualifying Statement, 3.10. The Existential Quantifier, 3.11. The Universal Quantifier. .	i. Explain Target list, Existential Quantifier,

SW-3 Suggested Seasonal Work (SW):

a. Assignments:

(i) Explain Join Natural, Theta & Outer Join.

b. Presentation

c. Pictorial representation of different Relational Calculus:

CA104: **Retrieve Any Type Of Information From A Database By Formulating Complex Queries In SQL.**

Approximate Hours

Item	Appx. Hrs.
Cl	13
LI	12
SW	1
SL	1
Total	27

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
O4.1 Explain Relational Implementation with SQL, Relational Implementations. SO4.2 To An Overview.Schema and TableDefinition. SO4.3 Explain Data Manipulation SO4.4 Explain Relational Algebra Operations SO4.5 Explain Using SQL with Data Processing Languages	1. Selection of rows and columns, renaming columns, use of distinct keyword 2. Select clause is used to list the attributes desired In the result of a query. It corresponds to the projection operation of the relational algebra: E.g. select EMPLOYEE 3. SQL provides a case construct which we can use to perform both the update with a single update statement avoiding the problem with the order of Updates. 4.demonstrate SUM, AVG 5. Demonstrate COUNT, MAX,	4.1 Unit-4 : Relational database implementation 4.2 (12 Lectures) 4.3 Schema definition, 4.4 Data types & domains, Defining Tables. 4.5 Simple Queries (SELECT, FROM, WHERE), Multiple-Table Queries, Subqueries, Correlated Subqueries. 4.7 EXISTS and NOT EXISTS Operators. 4.8 Built-ln Functions (SUM, AVG, COUNT, MAX, and MIN). GROUP BYand HAVING clause 4.10 Built-In Functions	i. Define Data Manipulation

	6. Demonstrate Group by anh Having clause.	4.11 UNION, INTERSECT, EXCEPT, JOIN. Database Change Operations. 4.12 INSERT, UPDATE, DELETE. 4.13 View Definition, Restrictions on View Queries and Updates	

SW-4 Suggested Sessional Work (SW):

Assignments: a.

(i) Database Change Operation.

b. Presentation

c. Pictorial representation of different Built-ln Functions

01CA411.**5: Analyses The Existing Design Of A Database Schema And Apply Concepts Of Normalization To Design An Optimal Database.**

Item	Appx. Hrs
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO5.1 Understand Physical Access of the Database. Physical Storage Media **SO5.2 Explain** Disk Performance Factors **SO5.3 Explain** Data Storage Formats on Disk **SO5.4** Discuss Input/output Management. File Organizing and Addressing Methods. **SO5.5 Discuss** Hashing	1) JOINS: SQL Joins are used to query data from two or more tables, based on a relationship between certain columns in these tables. 2) Create a personalized collection of relation that is better	**Unit5: INPUT-OUTPUT:** (12 Lecture) 5.1 Secondary Storage, 5.2 Physical Storage Blocks, 5.3 : Access Motion Time, 5.4 Head Activation Time, 5.5 Rotational Delay, 5.6 Data Transfer Rate, 5.7 Data Transfer Time.	1. Disk Performance Factors 2. Sequential File Organization

	user's intuition than is logical model Creation of Views 3) To define a view we must give the view a better name and must state the query that computes the view. Syntax: create vieu'<view najne> as <query expression> 4) Study the structure of the harddisk. 5) Study the structure of the floppy disk. 6) Study the structure of the pendrive .	5.8 Track Format, Record Format— 5.9 Fixed-Length Records & Variable-Length Records, 5.10 Sequential File Organization, Indexed Sequential File Organization 5.11 Direct File Organization. 5.12 Static Hash Functions and Dynamic Hash Functions Synchronization,	

SW-5 Suggested Sessional Work (SW):

b. Assignments:

1. Indexed Sequential File Organization.

c. Presentation:

d. Other Activities (Specify): Group discussion on important topics.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instruction (LI)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
01CA411.1 At the end of this chapter the student will Explain The Features Of Database Management Systems And Relational Database.	13	**12**	1	1	27
01CA411.2 At the end of this chapter the student will Design Conceptual Models Of A Database Using ER Modelling For Real Life Applications And Construct Queries In Relational Algebra.	11	12	1	1	25
01CA411.3 At the end of this chapter the student will Create And Populate A RDBMS For A Real-Life Application, With Constraints And Keys, Using SQL	11	**12**	1	1	25
01CA411.4 At the end of this chapter the student will Retrieve Any Type Of Information From A Database By Formulating Complex Queries In SQL.	13	12	1	1	27
01CA411.5 At the end of this chapter the student will Analyses The Existing Design Of A Database Schema And Apply Concepts Of Normalization To Design An Optimal Database.	12	**12**	1	1	26
Total Hours	60	**60**	5	5	130

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Unit-1	03	02	03	08
CO-2	Unit-2	03	01	05	09
CO-3	Unit-3	03	07	02	12
CO-4	Unit-4	03	05	05	13
CO-5	Unit-5	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
8. Brainstorming

Suggested Learning Resources:

Books:

S. No.	Title	Author	Publisher	Edition & Year
1	SQL, PL/SQL – The Programming Language of Oracle	Ivan Bayross	Prentice Hall	1 Dec 2010
2	SQL & PL / SQL for Oracle 11g Black Book	P.S. Deshpande	Pearson Education	7 Jul 2011
3	Mastering Oracle SQL	Sanjay Mishra	Morgan Kauffmann Publishers	17 Apr 17 Apr 2002 2002

C. Alternative NPTEL/SWAYAM/MOOC Course (if any): NA

Curriculum Development Team

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COs, POs and PSOs Mapping

Course Title: B.Sc. (IT)

Course Code: 01CA411

Course Title: Database Management Systems Using PL/SQL

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO1 Explain The Features Of Database Management Systems And Relational Database.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO2: Design Conceptual Models Of A Database Using ER Modelling For Real Life Applications And Construct Queries In Relational Algebra.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2

CO3: Create And Populate A RDBMS For A Real-Life Application, With Constraints And Keys, Using SQL	**1**	**1**	**2**	**2**	**1**	**2**	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**3**
CO4: Retrieve Any Type Of Information From A Database By Formulating Complex Queries In SQL.	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**1**	**2**	**3**	**3**	**3**	**3**	**2**	**2**
CO.5: Analyses The Existing Design Of A Database Schema And Apply Concepts Of Normalization To Design An Optimal Database.	-	-	-	**1**	**1**	**3**	**3**	**3**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**3**	**3**

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO1: Explain The Features Of Database Management Systems And Relational Database.	SO1.1 SO1.2 SO1.3 SO1.4		UNIT – I: Management Systems And Relational Database: 1.1,1.2,1.3,1.4,1.5,1.6,1.7	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO2: Design Conceptual Models Of A Database Using ER Modelling For Real Life Applications And Construct Queries In Relational Algebra.	SO2.1 SO2.2 SO2.3 SO2.4		UNIT – II: ER Modelling For Real Life Applications And Construct Queries In Relational Algebra 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3: Create And Populate A RDBMS For A Real-Life Application, With Constraints And Keys, Using SQL	SO3.1 SO3.2 SO3.3 SO3.4		UNIT – III: Constraints And Keys, Using SQL 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO4: Retrieve Any Type Of Information From A Database By Formulating Complex Queries In SQL.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5		Unit-4: Type Of Information From A Database By Formulating Complex Queries In SQL. 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO.5: Analyses The Existing Design Of A Database Schema And Apply Concepts Of Normalization To Design An Optimal Database.	SO5.1 SO5.2 SO5.3 SO5.4		Unit-5: Design An Optimal Database. 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10,5.11	

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Semester-IV

Course Code: **03CA431**

Course Title: **E-Commerce**

Pre-requisite: **Basic understanding of Business concepts and online technologies**.

Rationale: This syllabus aims to equip students with a robust foundation in e-Commerce, integrating historical context, technological advancements, and critical security considerations for a comprehensive understanding of this dynamic field.

Course Outcomes:

03CA431.1. To learn the fundamentals of E — Commerce and its process.
03CA431.2. To understand the role of E- commerce in the present scenario along with the concepts of security and its applications.
03CA431.3. To gain knowledge of e-commerce business needs and resources and match to technology considering human factors and budget constraints.
03CA431.4. To apply knowledge of changing technology on traditional business models and strategy.
03CA431.5. To have skills to communicate effectively and ethically using electronic communication.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Open Elective	**03CA431A**	**E-Commerce**	4	0	1	1	6	4

Legend: **CI**: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW &SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

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Theory

Board of Study	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment	Total Marks
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out Of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+ AT)	(ESA)	(PRA+ ESA)
OE	03CA431A	E-Commerce	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

03CA431.1: To learn the fundamentals of E — Commerce and its process.

Approximate Hours

Item	Appx. Hrs.
Cl	9
LI	0
SW	2
SL	1
Total	12

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO1.1 Understand the historical evolution and categorization of e-commerce. **SO1.2** Differentiate between the types of e-commerce and articulate their respective advantages and disadvantages. **SO1.3** Identify and analyze the key elements of e-commerce in practical scenarios. **SO1.4** Evaluate the principles underlying effective e-commerce strategies. **SO1.**5 Assess the significance of common service infrastructure and other key support layers in the e-commerce ecosystem. .	.	**Unit-1.0** Introduction to E-Commerce 1.1 Introduction & Brief history of e-commerce 1.2 Types 1.3 Advantages & Disadvantages of e-commerce 1.4 Elements of e-commerce 1.5 Principles of e-commerce 1.6 Messaging and Information distribution 1.7 Messaging and information distribution 1.8 Common service infrastructure 1.9 other key support Layers.	1. Explore the evolution and current trends of e-commerce through online articles and case studies.

SW-1Suggested Sessional Work (SW):

a. **Assignments**:

1. Analyze a specific e-commerce platform, outlining its history, business model, advantages, and potential areas for improvement.

b. Mini Project:

1. Develop a basic e-commerce website with essential functionalities, emphasizing user-friendly design and secure payment gateways.

c. Other Activities (Specify):

1. Participate in a virtual panel discussion or webinar on emerging technologies shaping the future of e-commerce.

03CA431.2: To understand the role of E- commerce in the present scenario along with the concepts of security and its applications.

Approximate Hours

Item	Appx. Hrs.
Cl	10
LI	0
SW	2
SL	1

Total	13

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO1.1 Define EDI and its origin, understanding the system approach and communication strategies. **SO1.2** Explain the migration process to open EDI, emphasizing its benefits. **SO1.3** Demonstrate the mechanics involved in EDI, showcasing practical application. **SO1.4** Evaluate the integration of E-commerce with WWW/Internet, discerning its impact. **SO1.5** Develop an understanding of E-Government concepts and apply them in various contexts, including G2C, G2B, and G2G applications.	.	**Unit-2.0** EDI Introduction 1.1 EDI to e-commerce: 1.2 EDI - Origin System approach 1.3 Communication approach 1.4 Migration to open EDI-Approach Benefits 1.5 Mechanics 1.6 E.com with WWW/Internet 1.7 E-Government Concepts 1.8 Applications of G2C 1.9 G2B 1.10 G2G	1. Explore EDI's evolution, covering its origin, system approach, and communication strategies.

SW-2 Suggested Sessional Work (SW):

a. **Assignments**:
   1. Investigate the advantages and migration processes of open EDI, emphasizing its approach and benefits.

b. Mini Project:
   1. Develop an E-commerce platform integrated with the WWW/Internet, showcasing practical applications and mechanics.

c. Other Activities (Specify):
   1. Dive into E-Government concepts and highlight real-world scenarios with Applications of G2C, G2B, and G2G interactions

03CA431.3: To gain knowledge of e-commerce business needs and resources and match to technology considering human factors and budget constraints.

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO3.1 Apply OSI and TCP/IP Models for Efficient Network Communication. **SO3.**2. Evaluate the Advantages and Disadvantages of LAN, WAN, MAN Internetworking. **SO3.**3. Analyze the Distinctions Between Internet and Online Services. **SO3.**4. Assess the Impact of Architecture Choices: Open vs. Closed, Controlled vs. Uncontrolled. **SO3.**5. Critically Examine Pricing Models: Metered Pricing vs. Flat Pricing, Balancing Innovation and Control.	.	**Unit-3: Basics of Electronic communication** 3.1. Electronic communication PC 3.2. Networking 3.3. Network topologies 3.4. Communication media 3.5. E-mail 3.6. OSI and TCP/IP Models 3.7. LAN, WAN, MAN Internetworking — Bridges and gateways 3.8. Internet Vs Online services 3.9. Open vs. Closed Architecture 3.10. Controlled contained 3.11. Uncontrolled contained 3.12. Metered Pricing Vs Flat pricing Innovation Vs Control.	1. Explore electronic communicatio n, PC, and networking fundamentals, covering network topologies, communicatio n media, and the OSI/TCP/IP Models.

SW-3 Suggested Sessional Work (SW):

a. **Assignments**:

1. Analyze the distinctions between LAN, WAN, MAN, and investigate the role of bridges and gateways in internetworking, comparing Internet and online services with a focus on open vs. closed architecture.

b. Mini Project:

1. Develop a controlled content e-commerce platform, emphasizing metered pricing versus flat pricing strategies, integrating innovative features while ensuring user security.

c. Other Activities (Specify):

1. Participate in discussions on the implications of controlled versus uncontrolled content in e-commerce, examining the balance between innovation and control for sustainable business growth.

03CA431.4: To apply knowledge of changing technology on traditional business models and strategy.

Approximate Hours

Item	Appx. Hrs.
Cl	14
LI	0
SW	2
SL	1
Total	17

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Demonstrate proficiency in utilizing web software development tools to create functional and user-friendly websites. **SO4.**2. Examine the key concepts behind the success of the web and its impact on e-commerce. **SO4.**3. Assess the overview of electronic payment systems, including digital cash, electronic checks, and online credit card-based systems. **SO4.**4. Develop an understanding of consumer legal and business issues in the context of electronic commerce. **SO4.**5. Comprehend the interplay of concepts and technologies shaping the web, particularly its role in e-commerce.		**Unit-4 :** Basics of WWW & Electronic Payment System**:** 4.1 WWW 4.2 Electronic Payment System 4.3 Applications 4.4 What is web 4.5 Why is the Web such a hit 4.6 The Web and E.Com 4.7 Concepts & Technology — Key concepts 4.8 Web Software development Tools 4.9 Electronic payment system — Overview 4.10 Electronic or digital cash 4.11 Electronic Checks 4.12 Online credit card-based system 4.13 Other Engineering financial instruments 4.14 Consumer legal and Business issues.	1. Explore key concepts of the World Wide Web and electronic payment systems independently.

SW-4 Suggested Sessional Work (SW):

a. **Assignments**:
   1. Apply learned concepts by completing assignments on web applications, development tools, and e-payment systems.

b. **Mini Project**:
   1. Develop a mini project integrating web concepts and electronic payment systems, addressing consumer legal and business issues.

c. Other Activities (Specify):
   1. Engage in discussions, case studies, and practical exercises to enhance understanding of web technologies and their implications in e-commerce.

03CA431.5: To have skills to Communicate effectively and ethically using electronic communication.

Approximate Hours

Item	Appx. Hrs.
Cl	15
LI	0
SW	2

SL	1
Total	18

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO5.1. Demonstrate the application of computer security measures to safeguard digital assets. **SO5.**2. Evaluate specific intruder approaches for potential vulnerabilities and countermeasures. **SO5.**3. Develop effective security strategies for diverse digital environments. **SO5.**4. Assess the use of cryptography, including public and private key encryption, for data protection. **SO5.**5. Execute advertising strategies on the internet, incorporating marketing principles and website creation, considering electronic publishing architecture and tools.		**Unit5:** Security and Application: 5.1 Basics of Security and Application 5.2 Need of computer security 5.3 Specific intruder approaches 5.4 Security strategies 5.5 Cryptography 5.6 Public key encryption 5.7 Private key encryption 5.8 Digital signatures 5.9 Advertising on the internet: Marketing 5.10 Creating a website. 5.11Electronic publishing issues 5.12 EP architecture 5.13 EP tools 5.14Web page EP-Baseline issues 5.15Application tools And publishing on the internet.	1. Explore specific intruder approaches for computer security. 2. Investigate cryptography fundamentals, including public and private key encryption and digital signatures.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Develop an internet marketing strategy and create a website.

b. Mini Project:

1. Implement an Electronic Publishing (EP) architecture, utilizing EP tools for web page development and addressing baseline issues.

c. Other Activities (Specify):

1. Engage in application tools and hands-on internet publishing, ensuring practical exposure beyond traditional coursework.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
03CA431.1: To learn the fundamentals of E — Commerce and its process.	9	2	1	12
03CA431.2: To understand the role of E- commerce in the present scenario along with the concepts of security and itsapplications.	10	2	1	13
03CA431.3: To gain knowledge of e-commerce business needs and resources and match to technology consideringhuman factors and budget constraints.	12	2	1	15
03CA431.4: To apply knowledge of changing technologyon traditional business models and strategy.	14	2	1	17
03CA431.5: To have skills to Communicate effectively and ethically using electroniccommunication.	15	2	1	18
Total Hours	**60**	**10**	**5**	**75**

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Introduction to E-Commerce	03	01	01	05
CO-2	EDI Introduction	02	02	01	05
CO-3	Basics of Electronic communication	03	07	05	15
CO-4	Basics of WWW & Electronic Payment System	04	06	05	15
CO-5	Security and Application	03	04	03	10
Total		11	15	20	15

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for E-Commerce will be held with written examination of 50 marks.

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/ Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to IT Industry
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/ Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

(a)Books:

S. No.	Title	Author	Publisher	Edition & Year
1	Electronic Commerce	Ravi Kalakota and Andrew B. Whinston	Addison-Wesley	1st , 1996
2	Web Commerce Technologies Handbook:	Daniel Minoli & Emma Minoli	McGraw-Hill	1st , 2017
3	E-Commerce	Dr. Varinder Bhatia	Excel Books	2013
4	Promise of E-Governance	MP Gupta		
7	Lecture note provided by Dept. Of CSE, AKS University, Satna.			

Curriculum Development Team

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Cos, POs and PSOs Mapping

Course: B.Sc. IT

Course Code: 03CA431A

Course Title: E-Commerce

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1: To learn the Commerce and its process.	2	2	3	3	3	1	1	1	1	1	1	3	2	3	3	1	2
CO 2 To understand the role of E- commerce in the present scenario along with the concepts of security and its applications.	1	3	2	3	2	2	2	1	1	1	1	3	2	2	2	1	3
CO3: To gain knowledge of e-commerce business needs and resources and match to technology considering human factors and budget constraints.	2	2	2	3	3	2	1	1	1	1	1	3	1	1	2	2	2
CO 4: To apply knowledge of changing technology on traditional business models and strategy.	1	2	3	2	3	2	1	1	1	2	1	3	3	3	3	2	2
CO 5: To have skills to Communicate effectively and ethically using electronic communication..	1	2	2	3	3	1	1	2	1	2	1	3	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO1: To learn the Commerce and its process.	SO1.1 SO1.2 SO1.3 SO1.4		UNIT – I: Introduction & Brief history of e- commerce 1.1,1.2,1.3,1.4,1.5,1.6,1.7	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO2: To understand the role of E-commerce in the present scenario along with the concepts of security and its applications.	SO2.1 SO2.2 SO2.3 SO2.4		UNIT – II EDI - Origin System approach 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3: To gain knowledge of e-commerce business needs and resources and match to technology considering human factors and budget constraints.	SO3.1 SO3.2 SO3.3 SO3.4		UNIT – III: Electronic communication PC 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO4: To apply knowledge of changing technology on traditional business models and strategy.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5		UNIT-4:. Basics of WWW & Electronic Payment System 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO.5: To have skills to Communicate effectively and ethically using electronic communication	SO5.1 SO5.2 SO5.3 SO5.4		UNIT-5 Security and Application: 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10,5.11	

Semester-IV

Course Code: **03CA432**
Course Title: **Computer Maintenance & Troubleshooting.**
Pre-requisite: Open to all, no previous knowledge needed.

Rationale: Comprehensive understanding of IT systems, from hardware fundamentals to troubleshooting and maintenance. By covering topics such as computer hardware components, storage devices, input/output devices, output devices, and troubleshooting methodologies, participants gain the necessary knowledge and skills to effectively manage and troubleshoot IT systems. This holistic approach ensures that participants are equipped with a diverse skill set to address various hardware and software issues, optimize system performance, and implement preventive maintenance measures, ultimately contributing to the efficient operation of IT infrastructure in professional settings.

Course Outcomes:

On successful completion of this course, the students will be able to:

03CA432.1	Identify and understand the hardware components in the computersystem.
03CA432.2	Install, configure and update Operating Systems, device drivers and software's.
03CA432.3	Install, configure and maintain various components in computer systemand peripheral devices.
03CA432.4	Diagnose faults, repair and maintain computer system and itsperipherals.
03CA432.5	Do preventive maintenance of computer system and its peripherals.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credit (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Open Elective	03CA 432	Computer Maintenance & Troubleshooting.	4	0	2	1	7	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)

SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Scheme of Assessment:
Theory

Board of Study	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
OE	**03CA432**	Computer Maintenance & Troubleshooting.	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

03CA432.1 **OOP Mastery: Students will grasp key Object-Oriented Programming principles, applying encapsulation, inheritance, and polymorphism for effective problem-solving.**

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	0
SW	2
SL	1
Total	10

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO1.1 Identify core components inside a PC and differentiate between different types and generations of computers. **SO1.2** Recognize the devices required for using laptops and understand their functionalities. **SO1.3** Define motherboard and its components/ connections, including functional block diagram, slots, and types/form factors such as AT, Baby AT, ATX, LPX, NLX, and BTX. **SO1.4** Explain CPU concepts such as CPU speeds, word size, data path, internal cache, slots, and sockets, as well as differentiate between CISC and RISC processors. **SO1.5** Understand system memory, including its definition,		**Unit-1 Inside the PC, Motherboard, CPU, System Controller, Chipset, System Memory,** 1.1 Introduction to Computer Hardware • Overview of core components inside a PC • Discussion on different types and generations of computers • Importance of understanding computer hardware in modern technology. 1.2 Peripheral Devices and Ports • Identification of devices required for using laptops • Explanation of various types of ports and their connecting devices	SL 1. Identify Computer Hardware's,

memory sizes, speeds, and shapes (DIP, ZIP, SIPP, SIMM, DIMM, RIMM), as well as different memory modules such as Dynamic RAM, SDRAM, LDDR SDRAM, SLDRAM, DRDRAM, Fast Page Mode (FPM) DRAM, and Extended Data Out (EDO) DRAM. .		• Hands-on activity: Identifying ports and connecting devices 1.3 Understanding Expansion Buses and Motherboard • Definition of motherboard and its components/connections • Functional block diagram of a motherboard • Types/form factors of motherboards (AT, Baby AT, ATX, etc.) • Explanation of expansion buses and their architectures. 1.4 Central Processing Unit (CPU) and Chipsets • Overview of CPU concepts: CPU speeds, word size, data path, etc. • Differentiation between CISC and RISC processors • Explanation of chipsets, their definition, and roles of North and South Bridge 1.5 Central Processing Unit (CPU) and Chipsets • Understanding system memory: definition, memory sizes, speeds, etc. • Recap of key concepts learned throughout the instruction	

		• Recap of key concepts learned throughout the instruction • Q&A session and feedback collection 1.6 Central Processing Unit (CPU) and Chipsets • Introduction to storage devices such as hard disk drives (HDDs), solid-state drives (SSDs), and optical drives • Explanation of data management concepts including file systems, partitions, and formatting • Demonstration of installing and configuring storage devices on a computer system • Discussion on best practices for data backup and storage security 1.7 Central Processing Unit (CPU) and Chipsets • Overview of common hardware issues and troubleshooting techniques • Introduction to diagnostic tools and software for identifying hardware problems • Hands-on troubleshooting exercises to practice diagnosing and resolving hardware issues • Guidance on regular maintenance tasks to optimize computer performance and prolong hardware lifespan	

		1.8 Introduction to Core Components: • Provide an overview of essential hardware components, including the motherboard, CPU, RAM, storage devices, and input/output peripherals. • Discuss the function of each component and its significance in the overall operation of a computer system. 1.9 Hands-on Component Identification: • Conduct a practical session where participants can physically identify and label different hardware components within a computer system. • Encourage participants to locate and describe key components on actual hardware setups or through visual aids. 1.10 Understanding Data Pathways: • Explain the flow of data between various hardware components within a computer system, emphasizing the role of buses, data pathways, and interfaces. • Illustrate data pathways using diagrams or	

		Flowcharts to enhance understanding. 1.11 Importance of Compatibility: • Discuss the importance of hardware compatibility in building and upgrading computer systems. • Highlight considerations such as form factors, socket types, and interface standards to ensure seamless integration of components. 1.12 Practical Hardware Assembly: • Demonstrate the process of assembling a computer system from individual hardware components. • Provide step-by-step guidance on installing the CPU, RAM, storage devices, and connecting peripherals, emphasizing proper handling and installation techniques.	

SW-1 Suggested Sessional Work (SW):

Assignments:

1. Design a custom computer system tailored for video editing and graphic design tasks. Specify the key components including CPU, motherboard, memory, storage, and graphics card. Justify your component choices based on the client's requirements and workload demands.
2. Compare and contrast a chosen motherboard form factor (e.g., ATX, Mini-ITX) with others. Analyze factors such as size, expansion options, compatibility, and practical applications. Provide examples demonstrating the effectiveness of the chosen form factor in different computing environments.

Mini Project:

- "Building a Budget-Friendly Gaming PC: A Step-by-Step Guide"

03CA432.2 Install, configure and update Operating Systems, device drivers and software's,

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	0
SW	2
SL	1
Total	10

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO2.1 Understand the various interfaces used in hard disk drives (HDDs), including their speeds and compatibility (EIDE, Serial ATA, SCSI, SAS, USB, IEEE 1394). **SO2.2** Explain the concept of RAID and its application in data storage and redundancy. **SO2.3** Evaluate the advantages and disadvantages of Solid State Drives (SSDs) for laptops compared to traditional HDDs. **SO2.4** Analyze disk performance		**Unit-2.0 Introduction to Hard Disk Interfaces** 1.1 Control Structure Comprehensive. • Provide an overview of different hard disk interfaces such as EIDE, Serial ATA, SCSI, SAS, USB, and IEEE 1394 (Firewire). • Discuss the evolution of these interfaces and their respective advantages and limitations. • Explain the importance of selecting the appropriate interface based on system requirements and performance needs..	SL 1 Exploring Advanced RAID Configurations and Implementation Techniques

Metrics such as seeks, latency, and data transfer rates, and their impact on system performance. **SO2.5** Familiarize about various types of Storage and Devices, DVD, CD, Interfacing.		1.2 RAID (Redundant Array of Independent Disks) Fundamentals • Define RAID and its purpose in data storage systems. • Introduce different RAID levels (RAID 0, RAID 1, RAID 5, etc.) and their configurations. • Discuss the benefits of RAID in terms of data redundancy, performance, and fault tolerance. 1.3 Solid State Drives (SSDs) vs. Hard Disk Drives (HDDs) • Compare and contrast SSDs and HDDs in terms of technology, performance, and reliability. • Discuss the advantages of SSDs, such as faster data access, lower power consumption, and resistance to mechanical failure. • Evaluate the cost-effectiveness of SSDs compared to traditional HDDs. 1.4 Disk Basics and Performance Characteristics • Explain fundamental disk components including heads, tracks, sectors, cylinders, clusters, and landing zones. • Discuss disk performance metrics such as seeks, latency, and data transfer rates. • Provide examples illustrating how these performance	

		Characteristics impact overall system performance. 1.5 Understanding Hard Disk Controllers (HDCs) • Define the role of hard disk controllers in managing data storage and retrieval. • Explore the functional blocks and functions of hard disk controllers. • Discuss the importance of HDCs in optimizing disk performance and ensuring data integrity. 1.6 DVD Drives and Blu-ray Technology • Introduce different types of DVD drives, their recording methods, and construction. • Discuss the interfacing of DVD drives with computer systems. • Provide an overview of Blu-ray technology, including its specifications and applications. 1.7 Drive Performance Criteria and Optimization • Explain key drive performance criteria such as data transfer rate, access time, and cache/buffer size. • Discuss strategies for optimizing drive performance, including disk defragmentation, cache management, and firmware Updates.	

		• Provide practical tips for selecting and configuring storage devices to meet specific performance requirements. 1.8 Data Backup Strategies: • Introduce various data backup strategies, including local backups, cloud backups, and offsite backups. • Discuss the importance of data redundancy and disaster recovery planning in ensuring data integrity and continuity. 1.9 Performance Optimization Techniques: • Explore techniques for optimizing storage device performance, such as disk defragmentation, disk cleanup, and TRIM command execution for SSDs. • Discuss the impact of fragmentation, file system choice, and caching mechanisms on storage performance. 1.10 Understanding File Systems: • Explain the concept of file systems and their role in organizing and managing data on storage devices. • Compare and contrast different file systems such as FAT32, NTFS, ext4, and APFS,	

		Highlighting their features and compatibility. 1.11 Disk Imaging and Cloning: • Demonstrate the process of creating disk images and clones for backup, migration, and system deployment purposes. • Discuss the benefits of disk imaging and cloning in simplifying data migration and system recovery tasks. 1.12 Emerging Storage Technologies: • Explore emerging storage technologies such as NVMe SSDs, 3D NAND flash, and Storage Class Memory (SCM). • Discuss the advantages of these technologies in terms of speed, capacity, and reliability, and their implications for future storage solutions.	

SW-2 Suggested Sessional Work (SW):

I. Assignments:

- SSD vs. HDD Comparison
  - Compare and contrast Solid State Drives (SSDs) and Hard Disk Drives (HDDs) in terms of performance, reliability, and cost-effectiveness.
  - Present findings in a concise report, highlighting key differences and providing recommendations for selecting the appropriate storage solution.
- RAID Storage Design
  - Design a RAID storage solution tailored to meet specific data redundancy and performance requirements.

- Develop a configuration plan and implementation guide, outlining hardware components, RAID level, and fault tolerance mechanisms.

Mini Project:

- "Optimizing Storage Performance: Implementing RAID for Data Redundancy and Speed"

03CA432.3 Install, configure and maintain various components in computer system and peripheral devices.

Approximate Hours

Item	AppX Hrs
Cl	13
LI	0
SW	2
SL	2
Total	12

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO3.1 Understand the operation and functionality of different input devices such as keyboards, Mice, scanners, cameras, joysticks, and microphones. **SO3.2** Identify various types of keyboards and their key switches (membrane, mechanical, rubber dome, capacitive), and understand Their interfaces. **SO3.3** Differentiate between types of mice and their interfaces and Operate them effectively. **SO3.4** Recognize different types of scanners and their		**Unit 3 Various Input and Output devices & peripherals.** 3.1 Introduction to Input Devices: • Provide an overview of input devices and their importance in computing systems. • Discuss the role of input devices in facilitating user interaction with computers. 3.2 Keyboard Operation and Types: • Explain the basic operation of keyboards and common keyboard layouts. • Introduce different types of keyboards including membrane, mechanical,	SL 1 Research on Advanced Input Device Technologies: SL 2 Experimentation with Input Device Interfaces:

applications, including image quality measurement and Optical Character Recognition (OCR). **SO3.5** Explain the role of cameras in video conferencing equipment and identify various types used in such setups.		Rubber dome, and capacitive keyboards. 3.3 Mouse Operation and Types: • Demonstrate the operation of a mouse and its various functions. • Explore different types of mice such as optical, laser, and trackball mice. 3.4 Scanner Types and Applications: • Describe the functionality of scanners and their applications in document digitization and image processing. • Discuss different types of scanners including flatbed, sheet-fed, and handheld scanners. 3.5 Camera in Video Conferencing: • Explain the role of cameras in video conferencing equipment. • Discuss different types of cameras used in video conferencing setups, such as webcams and PTZ cameras. 3.6 Joystick Operation and Gaming: • Introduce the operation of joysticks and their use in gaming consoles like PlayStations. • Discuss the different types of joysticks and their applications in gaming and flight simulation. 3.8 Microphone in Video Conferencing:	

		• Explain the importance of microphones in video conferencing equipment for capturing audio. • Discuss different microphone types used in video conferencing setups, including desktop, lapel, and conference microphones. 3.9 Hands-on Demonstrations and Practice: • Provide hands-on opportunities for students to interact with various input devices. • Conduct practical exercises to reinforce learning and familiarize students with the operation and functionality of each device. 3.10 Ergonomics and Input Devices: • Discuss ergonomic considerations when selecting and using input devices such as keyboards and mice. • Explore ergonomic design principles, including keyboard layout, key spacing, and mouse shape, to promote user comfort and reduce the risk of repetitive strain injuries. 3.11 Connectivity Standards and Compatibility: • Introduce common connectivity standards for input devices, including USB, Bluetooth, and Wireless protocols.	

		• Discuss the importance of compatibility between input devices and interface standards to ensure seamless integration and functionality. 3.12 Accessibility Features: • Explore accessibility features built into input devices to accommodate users with disabilities or special needs. • Discuss features such as ergonomic keyboards, adaptive mouse devices, and accessibility settings in operating systems to promote inclusivity and usability. 3.13 Advanced Input Technologies: • Introduce advanced input technologies such as touchscreens, stylus pens, and gesture recognition. • Discuss the applications and advantages of these technologies in specialized fields such as graphic design, digital art, and interactive presentations.	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

- Designing an Ergonomic Workspace
  - Design an ergonomic workspace setup tailored to maximize comfort and productivity for computer users.
- Comparative Analysis of Input Device Interfaces
  - Conduct a comparative analysis of different input device interfaces to evaluate their performance and usability.

b. Mini Project:

- Enhancing User Experience: Optimizing Input Device use case

03CA432.4: Diagnose faults, repair and maintain computer system and its peripherals.

Approximate Hours

Item	AppX Hrs
Cl	13
LI	0
SW	2
SL	2
Total	14

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Understand the technology and functionality of various output devices, including monitors, printers, plotters, and speakers. **SO4.2** Describe the parameters and characteristics of Cathode Ray Tube (CRT) monitors and their role in display technology. **SO4.3** Identify the different types of digital displays, such as Liquid Crystal Displays (LCDs), Plasma Displays, Thin Displays, and Light Emitting Displays (LEDs), and comprehend their underlying technologies. **SO4.4** Explain the components of graphics cards and their functions, including accelerated video capabilities, and recognize		**Unit-4.0 Output Devices, Maintenance of computer system and peripherals.** 4.1 Introduction to Output Devices: • Provide an overview of output devices and their significance in computing systems. • Discuss the role of output devices in converting digital data into human-readable formats. 4.2 Monitor Technology and CRT Parameters: • Explain the technology behind monitors, focusing	SL 1 Exploring Advanced Display Technologies: SL 2 DIY Printer Troubleshooting and Maintenance:

The evolution of graphics standards like CGA, EGA, and VGA. **SO4.5** Identify different types of printers, their interfaces, and methods for printer sharing with other computers.		On Cathode Ray Tube (CRT) displays. • Discuss key parameters of CRT monitors such as resolution, refresh rate, and color depth. 4.3 Digital Display Technology: • Introduce digital display technologies including LCDs, Plasma Displays, Thin Displays, and LEDs. • Compare and contrast the features and characteristics of different digital display types. 4.4 Graphics Cards and Video Standards: • Describe the components and functionalities of graphics cards. • Explore the evolution of video standards such as CGA, EGA, and VGA. 4.5 Printer Technology and Interfaces: • Discuss the fundamentals of printer technology and the types of printers available. • Explain printer interfaces and methods for sharing printers with other computers. 4.6 Inkjet Printers: • Detail the parts and working principles of inkjet printers. • Discuss the advantages and limitations of inkjet printing technology.	

		4.7 LaserJet Printers: • Describe the components and operation of LaserJet printers. • Compare LaserJet printers with inkjet printers in terms of speed, quality, and cost. 4.8 Plotters and Large Format Printing: • Introduce plotters and their applications, particularly in large format printing. • Discuss the differences between A4, A3, and large format printers. 4.9 Speaker Technology: • Explain the role of speakers in audio output and video conferencing equipment. • Discuss speaker technology and audio reproduction principles. 4.10 Hands-on Demonstrations and Activities: • Provide hands-on activities to explore the functionality of different output devices. • Conduct demonstrations to showcase the operation and features of monitors, printers, plotters, and speakers. 4.11 Interactive Display Technologies: • Explore interactive display technologies such as touchscreen monitors,	

		Interactive whiteboards, and interactive projectors. • Discuss the applications of interactive displays in education, presentations, gaming, and collaborative work environments. 4.12 Energy Efficiency and Environmental Impact: • Discuss the energy consumption and environmental impact of various output devices, including monitors, printers, and speakers. • Explore energy-saving features, eco-friendly materials, and recycling programs aimed at reducing the environmental footprint of output devices. 4.13 Remote Display Technologies: • Introduce remote display technologies such as screen mirroring, wireless display, and virtual desktop infrastructure (VDI). • Discuss the advantages of remote display technologies in enabling flexible work arrangements, remote collaboration, and centralized management of display resources.	

SW-4 **Suggested Sessional Work (SW):**

d. Assignments:

- Conduct a comparative analysis of different display technologies, including LCD, OLED, Plasma, and LED.
- Design a printer setup tailored to meet the printing needs of a small business or home office.

e. Mini Project:

- Optimizing Printing Solutions: Designing an Efficient Printer Setup for Small Businesses

03CA432.5: Do preventive maintenance of computer system and its peripherals.

Approximate Hours

Item	Appx. Hrs.
Cl	10
LI	0
SW	2
SL	2
Total	14

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO5.1 Demonstrate proficiency in troubleshooting hardware components such as motherboards, keyboards, hard disk drives, printers, and other peripherals. **SO5.2** Apply appropriate diagnostic techniques to identify and resolve common hardware problems, including issues related to connectivity, malfunctioning components, and hardware failures. **SO5.3** Operating system expertise: Participants understand various operating systems like Microsoft Windows, iOS, Linux, and Open Source, and can install and troubleshoot		**Unit-5.0 Computer Maintenance and Peripherals.** 5.1 Introduction to Troubleshooting Methodologies: • Provide an overview of troubleshooting methodologies, emphasizing the importance of systematic approaches. • Introduce the functions of IPL (Initial Program Load), hardware testing sequences, and error message interpretation. 5.2 Hands-on Hardware Troubleshooting: • Conduct practical exercises to familiarize participants with diagnosing and resolving hardware issues.	SL 1 Independent Troubleshooting Practice: SL 2 Research on Advanced Troubleshooting Techniques

Them. **SO5.4** Security awareness: Participants recognize the importance of antivirus software and can select, install, and configure antivirus programs to protect against malware threats. **SO5.5** OEM application management: Participants can install and troubleshoot OEM applications to ensure their proper functioning.		• Provide scenarios involving motherboard, keyboard, hard disk drive, printer, and other peripheral malfunctions for participants to troubleshoot. 5.3 Preventive Maintenance Techniques: • Discuss the significance of preventive maintenance in prolonging hardware lifespan and reducing downtime. • Introduce preventive maintenance tools and techniques, such as cleaning kits, software diagnostics, and hardware inspections. 5.4 Operating System Installation: • Guide participants through the installation process of different operating systems, including Microsoft Windows, iOS, Linux, and Open Source systems. • Address common installation issues and troubleshooting strategies. 5.5 Antivirus Software Configuration: • Explain the role of antivirus software in safeguarding IT systems against malware threats. • Demonstrate how to select, install, and configure antivirus programs to provide optimal protection. 5.6 OEM Application Installation: • Provide instructions on installing OEM applications and troubleshooting installation errors. • Highlight the importance of OEM software in enhancing	

		System functionality and compatibility. 5.7 Error Message Interpretation: • Teach participants how to interpret error messages and utilize diagnostic tools to identify system-level issues. • Conduct exercises where participants analyses error messages and devise solutions based on diagnostic results. 5.8 Interactive Problem-Solving Sessions: • Facilitate interactive problem-solving sessions where participants collaborate to troubleshoot real-world IT issues. • Encourage participants to apply the knowledge and skills gained to address challenging scenarios effectively. 5.9 Network Performance Optimization: • Discuss techniques for optimizing network performance, such as bandwidth management, Quality of Service (QoS) configuration, and traffic prioritization. • Explore network monitoring tools and diagnostic utilities for identifying bottlenecks, latency issues, and network congestion. 5.10 Disaster Recovery Planning: • Introduce the concept of disaster recovery planning and its importance in mitigating the impact of	

		System failures, data loss, and security breaches. • Discuss strategies for data backup, offsite storage, system redundancy, and recovery procedures to minimize downtime and ensure business continuity.	

SW-5 Suggested Sessional Work (SW):

III. Assignments

- Analyses a series of troubleshooting scenarios involving hardware and software issues commonly encountered in IT environments.
- Develop a preventive maintenance plan for a small business or home office environment to ensure the optimal performance and longevity of IT hardware.

b. Mini Project:

- IT Troubleshooting Simulator

Description: Create an interactive simulation for troubleshooting common IT issues encountered in office environments. Participants will diagnose and resolve hardware failures, software errors, network connectivity issues, and security threats within a virtual environment.

S2-COSC1G.1 **Identify and understand the hardware components in the computer system**.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total Hour (Cl+SW+Sl)
03CA432.1 Identify and understand the hardware components in the computer system.	12	2	1	10
03CA432.2 Install, configure and update Operating Systems, device drivers and software's.	12	2	1	10
03CA432.3 Install, configure and maintain various Components in computer system and peripheral devices.	13	2	2	12
03CA432.4 Diagnose faults, repair and maintain computer system and its peripherals.	13	2	2	14

S2-COSC1G.5 Do preventive maintenance of computer system and its peripherals.	10	2	2	12
Total Hours	60	10	8	78

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
03CA432.1	Task: Identify and describe the core components of a computer system, including the motherboard, CPU, RAM, storage devices, and input/output peripherals. Objective: Familiarize participants with fundamental hardware components, their functions, and interconnections, enabling them to understand their roles in computer operation.	02	01	01	04
03CA432.2	Task: Explore various storage devices such as HDDs, SSDs, and RAID arrays, understanding disk partitioning, RAID configurations, and storage technology characteristics. Objective: Equip participants with knowledge about storage devices, enabling them to implement basic RAID configurations and make informed decisions on storage solutions.	02	04	02	08
03CA432.3	Task:	03	05	04	12

	Understand the operation of input devices like keyboards, mice, scanners, and microphones, along with different interfaces (e.g., USB, HDMI) used in computing. Objective: Educate participants about input devices and interfaces, helping them identify devices, explain functionalities, and understand interactions with computer systems.				
03CA432.5	Task: Examine output devices such as monitors, printers, and speakers, and display technologies like LCD, LED, and OLED, understanding their characteristics and applications. Objective: Familiarize participants with output devices and display technologies, enabling them to describe features, roles, and evaluate suitability for specific applications.	02	08	05	15
03CA432.5	Task: Develop troubleshooting skills for common hardware and software issues, including preventive maintenance practices, to diagnose and resolve problems and implement maintenance measures. Objective: Enhance participants' troubleshooting skills and preventive maintenance knowledge in IT systems, enabling them to apply methodologies effectively and manage IT systems for optimal performance.	03	05	03	11
Total		**12**	**23**	**15**	**50**

Legend: R: Remember, U: Understand, A: Apply

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit any software development company
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook,Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

Textbooks:

- D Balasubramanian, Computer Installation and Servicing, Tata McGraw Hill Education Private Limited
- Mark Minasi, The Complete PC Upgrade & Maintenance Guide, BPB Publications
- Govind Rajalu, IBM PC and clones, Tata McGrew Hill Education Private Limited
- Books published by M.P. Hindi Granth Academy, Bhopal

Suggestive digital platform web links

- https //www.chtips.com/hindi/com puter-hardware-tutorials.php
- htto://nji. gov ng/images/Workshop_Papers/2017/IT_Workshop/s3.pdf
- hitp//www.gemishra. yolasite.com/resources/Repairing%20C omputer.pdf
- http://www.mphindigranthacademy.org/

Suggested equivalent online courses

- hiwos//urbanareas.net/in fovtrainins/computer-repai

Cos, POs and PSOs Mapping

Course: B.Sc. IT

Course Code: 03CA432

Course Title: Computer Maintenance & Troubleshooting

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1: Identify and understand the hardware components in the computer system.	2	2	3	3	3	1	1	1	1	1	1	3	2	3	3	1	2
CO 2: Install, configure and update Operating Systems, device drivers and software's.	1	3	2	3	2	2	2	1	1	1	1	3	2	2	2	1	3
CO3: Install, configure and maintain various components in computer system and peripheral devices.	2	2	2	3	3	2	1	1	1	1	1	3	1	1	2	2	2
CO 4: Diagnose faults, repair and maintain computer system and its peripherals.	1	2	3	2	3	2	1	1	1	2	1	3	3	3	3	2	2
CO 5: Do preventive maintenance of computer system and its peripherals.	1	2	2	3	3	1	1	2	1	2	1	3	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO1: Identify and understand the hardware components in the computer system.	SO1.1 SO1.2 SO1.3 SO1.4		1.1 UNIT – I: Introduction to Computer Hardware 1.1,1.2,1.3,1.4,1.5,1.6,1.7	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO2: Install, configure and update Operating Systems, device drivers and Software's.	SO2.1 SO2.2 SO2.3 SO2.4		UNIT – II Control Structure Comprehensive. 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3: Install, configure and maintain various components in computer system and peripheral devices.	SO3.1 SO3.2 SO3.3 SO3.4		UNIT – III: Provide an overview of input devices and their importance in computing systems. 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO4: Diagnose faults, repair and maintain computer system and its peripherals.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5		Unit-4:. Provide an overview of output devices and their significance in computing systems 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO.5: Do preventive maintenance of computer system and its peripherals.	SO5.1 SO5.2 SO5.3 SO5.4		Unit-5 Introduction to Troubleshooting Methodologies 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10,5.11	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application& Information Technology

Curriculum of BSC (IT) (Bachelor of Science)

(Revised as on 01 August 2023)

Semester-V

Course Code: 0CA505

Course Title: **WEB APPLICATION DEVELOPMENT**

Pre-requisite: **BASICS OF PROGRAMMING & INTERNET**

Rationale: The purpose of the Web Technologies course is to build the skills students will need as web designers. Web designers understand the principles of web technology and design as well as web design principles. In Web Technologies, students will build their technology skills using scripting with state-of-the-art web design software.

Course Outcomes:

On successful completion of this course, the students will be able to:

0CA505**.l** Understand basics of Internet, World Wide Web(WWW), Client-server Computing and have information of various Protocols.

0CA505**.2** Have Knowledge of various web browsers, familiarize with Java scripting, Client side scripting language, Web server Architecture, Database connectivity (DBC) and ODBC

0CA505**.3** Have knowledge of HTML, it's essential tags, Attributes, Text styles, Links to External Documents and different sections of a HTML page.

0CA505**.4** Develop skills to generate HTML and DHTML page and have knowledge of Java Script assisted style sheets (JSSS)

0CA505**.5** Have knowledge of Objects, Methods, Events and Functions and various types of text, styles and be able to relate JavaScript to DHTML

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Skill Enhancement	0CA505	Web Application Development	4	0	1	1	6	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback teachers ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Course Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment	Total Marks
			Class/ Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+ SA+CAT +AT)	(ESA)	(PRA + ESA)
SE	0CA505	**Web Application Development**	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

0CA505**.1: Understand basics of Internet, World Wide Web (WWW), Client server computing and have information of various Protocols.**

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	1
SL	1
Total	14

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO1.1 Understand the basics of the Internet **SO1.2** Understanding various terms used in Internet. **SO1.3** Understanding types of web pages. **SO1.4** Understanding Various types of protocol used in internet. SO1.5 Understand client server architecture. .		**Unit-1.0 Topics Basics of Internet and Web (7 Lectures)** **1.1** The Basics of the Internet **1.2** World Wide Web, **1.3** Web page, Home Page, **1.4** Web site **1.5** Static, Dynamic and Active web page **1.6** Overview of Protocols **1.7 SMTP, Gopher,** **1.8** Telnet, Emails **1.9** TFTP, **1.10** SNMP, **1.11** HTTP **1.12** Client-server computing concepts.	1. Learning various concepts related to the internet.

SW-1 Suggested Sessional Work (SW):

a. **Assignments:**
   i. Explain basic terminologies used in internet.
   ii. Explain various types of protocols.
b. **Mini Project: None**

c. **Other Activities (Specify):**
Describe client server Architecture.

0CA505.**2: Students will have Knowledge of various web browsers, familiarize with Java scripting, Client side scripting language, Web server Architecture, Database connectivity(DBC) and ODBC.**

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	1
SL	1
Total	14

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO2.1 To Understand the concept of web browser. **SO2.2** To learn about various types of browsers. **SO2.3** To implement VB Script and Java Script. **SO2.4** To understand Active X controls and Plug-ins. **SO2.**5 To learn about API web database connectivity.		**Unit-2.0 Web Client and Web Sever (7 Lectures)** **2.1** What is web browser? **2.2** Types of Web Browsers - e.g., Netscape navigator, Internet Explorer, **2.3** Mozilla Firefox. **2.4** Client Side Scripting Languages **2.5** VB Script and **2.6** Java Script. **2.7** Active X control and Plug-ins; **2.8** Web Server Architecture. **2.9** Image maps. **2.10** CGI. **2.11** API web database connectivity-DBC, **2.12** ODBC.	1. Try to Implement VB Script or Java Script

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. Explain client-side scripting VBScript and JavaScript.
ii. Explain web database connectivity using DBC and ODBC.

b. Mini Project:

Create an image mapping.

0CA505**.3: Students will have knowledge of HTML, it's essential tags, Attributes, Text styles, Links to External Documents and different sections of an HTML page.**

Approximate Hours

Item	AppX Hrs
Cl	16
LI	0
SW	1
SL	1
Total	18

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO3.1 Learning various HTML tags and attributes. **SO3.2** Creating web page using HTML tags. **SO3.3** Creating hyperlinks in HTML Documents. **SO3.4** Creating forms using HTML. **SO3.5** Using latest IDE for web page development.		**Unit-3 : Introduction to HTML (13 Lectures)** 3.1 Introduction to HTML 3.2 Essential Tags 3.3 Tags and Attributes 3.4 Text Styles and Text An-arguments, Text, Effects Events 3.5 Exposure to Various Tags (DIV, MARQUEE, NOBR, 3.6 DFN, HR, LISTING, Comment, IMG) 3.7 Colour and Background of Web Pages 3.8 Lists and their Types 3.9 Attributes of Image Tag 3.10 Hypertext, Hyperlink and 3.11Hypermedia, Links, Anchors and URLs 3.12 links to External Documents, 3.13 Different Section of a Page and Graphics 3.14 Footnote and e-mailing 3.15 Creating Table, Frame 3.16 Form and Style Sheet	1. Learning various attributes of HTML tags. 2. Learning online HTML Editors.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. Explain basic HTML tags and their properties.

ii. Create an HTML page that contains a selection box with a list of 5 countries.

b. Mini Project:

iii. Create an admission form using HTML tags.

c. Other Activities (Specify):

Use of latest editors for web development like. VS Code, Notepad++ etc.

BSC (IT)_WT .4: Students will develop skills to generate HTML and DHTML page and have knowledge of Java Script assisted style sheets (JSSS)

Approximate Hours

Item	AppX Hrs
Cl	8
LI	0
SW	1
SL	1

Total	10

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Understanding Dynamic HTML. **SO4.2** Using CSS in a web page **SO4.3** Embedding JSSS in HTML **SO4.4** Implementing ID Attribute. **SO4.**Understand DHTML events.		**Unit-4 : DHTML** **(7 Lectures)** 4.1 Dynamic HTML 4.2 Document Object Model 4.3 Features of DHTML 4.4 CSSP (Cascading Style Sheet Positioning) and 4.5 JSSS (JavaScript assisted Style Sheet) 4.6 Layers of Netscape 4.7 The ID Attribute 4.8 DHTML Events.	1. Differentiate between HTML And DHTML. 2. Learn CSS and JSSS.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

i. Write down the features of dynamic HTML.
ii. Explain Document Object Model.

b. Mini Project:

i. Design an admission form page with the help of CSS.

c. Other Activities (Specify):

Implementing CSS in your previously created web page.

BSC (IT)_WT .5: **Student will have knowledge of Objects, Methods, Events and Functions, and various types of text, and styles and be able to relate JavaScript to DHTML**

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	1
SL	1
Total	14

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO5.1 Creation of classes and object using Java Script. **SO5.2** Implementing events and functions using Java Script. **SO5.3** Connecting Java Script with DHTML. **SO5.4** Implementing arrays and dialog boxes. **SO5.**5 Performing dynamic changing text style.		**Unit-5: Java Script** 5.1 Objects 5.2 Methods. 5.3 Events 5.4 Functions 5.5 Tags 5.6 Operators 5.7 Data Types, Literals 5.8 Type Casting in JavaScript Programming 5.9 Array and Dialog Boxes 5.10 Relating JavaScript to DHTML 5.11 Dynamically Changing Text, 5.12 Style Content	1. Learn PHP as server-side scripting. 2. Use PHP to connect any database.

SW-5 Suggested Sessional Work (SW):

a. Assignments

i. Write a PHP program to print first ten Fibonacci numbers.

ii. Create HTML page with java script which takes integer number as a input and tells whether the number is divisible by 4 or not.

b. Mini Project:

i. Using HTML, CSS, Java script, PHP, MySQL, design and authentication module of a web page.

c. Other Activities (Specify):

Create form validation using PHP.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
CO1: Understand basics of Internet, World Wide Web (WWW), Client server Computing and have information of various Protocols	12	1	1	14
CO2: Students will have Knowledge of various web browsers, familiarize with Java scripting, Client side scripting language, Web server Architecture, Database connectivity (DBC) and ODBC.	12	1	1	14

CO3 : Students will have knowledge of HTML, it's essential tags, Attributes, Text styles, Links to External Documents and different sections of a HTML page.	16	1	1	18
CO4 : Students will develop skills to generate HTML and DHTML page and have knowledge of Java Script assisted style sheets (JSSS)	8	1	1	10
CO5: Student will have knowledge of Objects, Methods, Events and Functions and various types of text, styles and be able to relate JavaScript to DHTML.	12	1	1	14
Total Hours	**60**	**5**	**5**	**70**

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Understand basics of Internet, World Wide Web(WWW), Client server Computing and have information of various Protocols	02	01	01	04
CO-2	Have Knowledge of various web browsers, familiarize with Java scripting, Client side scripting language, Web server Architecture, Database connectivity (DBC) and ODBC	02	06	02	10
CO-3	Have knowledge of HTML, it's essential tags, Attributes, Text styles, Links to External Documents and different sections of a HTML page.	02	05	05	12
CO-4	Develop skills to generate HTML and DHTML page and have knowledge of Java Script assisted style sheets (JSSS)	02	10	05	17
CO-5	Have knowledge of Objects, Methods, Events and Functions and various types of text styles and be able to relate JavaScript to DHTML	03	02	02	07
Total		11	24	15	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Web Technology will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers

can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to software industry
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

A. Books:

S. No.	Title	Author	Publisher	Edition & Year
1	Beginning PHP5, Apache, and MySQL Web Development	Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz	Glass Wrox Publication	2005
2	Beginning HTML, XHTML, CSS, and JavaScript 2010	Jon Duckett	Wiley Publishing	2010
3	Web Technologies, Black Book, Dream Tech Press 2010	Kogent	Learning Solutions Inc Dream Tech Press	2010
4	HTML, XHTML and CSS Bible	Bryan Pfaffenberger, St even M. Schafer, Chuck White	**John Wiley & Sons**	2004

Curriculum Development Team

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CO, PO and PSO Mapping

Program: B.Sc.(IT)
Course Code: 0CA505
Course Title: Web Application Development

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS 0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer- based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
0CA505.1 Understand basics of Internet, World Wide Web (WWW), Client server Computing and have information of various Protocols	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
0CA505.2 Students will have Knowledge of various web browsers, familiarize with Java scripting, Client side scripting language, Web server Architecture, Database connectivity (DBC) and ODBC.	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3

0CA505. 3tudents will have knowledge of HTML, it's essential tags, Attributes, Text styles, Links to External Documents and different sections of a HTML page.	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**1**	**2**	**3**	**3**	**3**	**3**	**2**	**2**
0CA505.4Students will develop skills to generate HTML and DHTML page and have knowledge of Java Script assisted style sheets (JSSS)	**-**	**-**	**-**	**1**	**1**	**3**	**3**	**3**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**3**	**3**
0CA505.5. Student will have knowledge of Objects, Methods, Events and Functions and various types of text, styles and be able to relate JavaScript to DHTML.	**1**	**1**	**2**	**2**	**1**	**2**	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**3**

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map:

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self learning (SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO101 Understand basics of Internet, World Wide Web(W WW), Client server Computing and have information of various Protocols	SO1.1 SO1.2 SO1.3 SO1.4		Unit-1.0 **Topics Basics of Internet and Web** 1.1,1.2,1.3,1.4,1.5,1.6, 1.7	As mentioned in page number
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO102 Have Knowledge of various web browsers, familiarize with Java scripting, Client side scripting language, Web server Architecture, Database connective (DBC) and ODBC	SO2.1 SO2.2 SO2.3 SO2.4		Unit-2 **Web Client and Web Sever** 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO103 Students will have knowledge of HTML,it's essential tags, Attribute s, Text styles, Links to External Documents and different sections of a HTML page	SO3.1 SO3.2 SO3.3 SO3.4		Unit-3: **Introduction to HTML** 3.1, 3.2,3.3,3.4,3.5,3.6,3.7, 3.8,3.9,3.10, 3.11,3.12,3.13	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO104 Students will develop skills to generate HTML and DHTML page and have knowledge of Java Script assisted style sheets (JSSS)	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5		Unit-4: **DHTML** 4.1,4.2,4.3,4.4,4.5,4.6 ,4.7	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO103 5. Student will have knowledge of Objects, Methods, Events and Functions and various types of text, styles and be able to relate JavaScript to DHTML	SO5.1 SO5.2 SO5.3 SO5.4		Unit-5: **Java Script** 5.1,5.2,5.3,5.4,5.5,5.6, 5.7,5.8,5.9, 5.10,5.11	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application& Information Technology

Curriculum of BSC (IT) (Bachelor of Science)

(Revised as on 01 August 2023)

Semester-V

Course Code: **01CA512**

Course Title: Computer Network and Security

Pre-requisite: Student should have basic knowledge of computer Network

Rationale: The importance of cybersecurity in the digital world is immense. It is because the volume and sophistication of cyberattacks are constantly increasing. As our dependence on technology grows, so does our vulnerability to these attacks. Cybersecurity helps to protect our data and systems from these threats

Course Outcomes:

01CA512.1: Understand Computer Networks concepts and its uses.
01CA512.2: Understand Network Technologies and protocols.
01CA5123: Describe network components.
01CA512.4: Use suitable network components transmission media in internal and external Networking.
CO101.5: Understand basic principles of information security and its need.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Major	01CA512	Computer Network and Security	4	4	1	1	10	6

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) And others),
LI: Laboratory Instruction (Includes Practical performance laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Course Code	Course Title	Scheme of Assessment (Marks)		
			Progressive Assessment (PRA)	End Semester Assessment	Total Marks

			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CA T+AT)	**(ESA)**	(PRA+ ESA)
Major	01CA512	**Computer Network and Security**	15	20	5	5	5	50	50	100

Practical

Board of Study	**Couse Code**	**Course Title**	**Scheme of Assessment (Marks)**						
			Progressive Assessment (PRA)					**End Semester Assessment (ESA)**	**Total Marks** (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	**Viva1 (5)**	**Viva2 (5) (SA)**	**Class Attendance (AT)**	**Total Marks (CA+CT+SA+ CAT+AT)**		
Major	01CA512	Computer Network and information Security	35	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

01CA512.1**: Understand Computer Networks concepts and its uses**

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Approximate Hours

Item	AppX Hrs
Cl	12

LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning(SL)**
SO1.1 To understand the Computer Networks and networking elements SO1.2 To understand the Network Topologies SO1.3 To understand the Network Classification- LAN, MAN, WAN O1.4 To understand the Network Protocols and Services, SO1.5 To understand Layered Network architecture.	1. Study of UTP network cable 2. Study the color code of UTP cable 3. Categories of UTP n/w cable 4. Shielding of n/w cable 5. Electricity interference with n/w cable 6. Maximum length for which data cable can be used 7. Crimping of RJ45 connector and Punching of data n/w cable 8. Penta scanning of cabling work 9. Rules of UTP laying	**Unit-1** 1. Introduction to Computer Networks and networking elements 2. Network definition, Network Uses, 3. Network Topologies 4. Network Classification- LAN, MAN, WAN, 5. Network Protocols and Services, 6. Connection Oriented and Connectionless Services 7. Layered Network architecture. 8. Introduction and review of OSI and 9. TCP/IP Reference models 10. TCP/IP Protocol suite 11. NIC, Hub, Switch (Managed and Unmanaged 12. Routers and Gateways, Network standardization	Learn TCP/IP Protocol suite

SW-1 Suggested Sessional Work (SW):

Assignments:

- Discuss about NIC, Hub, Switch (Managed and Unmanaged) , Routers and Gateways, Network standardization

01CA5122.2 **Understand Network Technologies and protocols.**

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	2
SL	1
Total	15

SessionOutcomes (SOs)	LaboratoryInstruction (LI)	ClassroomInstruction (CI)	SelfLearning (SL)
SO2.1 To Understand the Data Communication Fundamentals and Techniques **SO2.2** To understand Analog and Digital Signals, Transmission Media **SO2.3** To understand Modulation and Multiplexing Techniques **SO2.4** To know Switching techniques and concept of Framing **SO2.2** To understand Frame structure and MAC address	1. Knowledge of Structured Cabling and its components 2. Information outlet with box 3. Network Rack (4U, 6U, 9U, 12U, 24U, 32U, 42U) 4. Patch Panel 5. Rack Management 6. Study of Optical Fiber cable 7. O Different cores of OFC (6 core, 12, 24 core) • Multimode & Single mode OFC cable 8. Shielding of OFC 9. Splicing/Termination of OFC.	**Unit-2** **1.** Data Communication Fundamentals and Techniques **2.** Analog and Digital Signals, Transmission Media **3.** Simplex, half duplex and Duplex data transmission, Data-rate Limits **4.** Modulation and **5.** Multiplexing Techniques **6.** Circuit Switching, Packet Switching – **7.** Connectionless Datagram switching, **8.** Connection Oriented Virtual Circuit Switching **9.** Modems, Digital subscriber Line,	1. learn about Ethernet/IEEE 802.3 protocol

		Cable TV for Data Transfer 10. concept of Framing, 11. Ethernet/IEEE 802.3 protocol 12. Frame structure and MAC address	

SW-2 Suggested Seasonal Work (SW):

- **Assignments:**

1. Discuss Connection Oriented Virtual Circuit Switching
2. Pictorial representation of different transmission medium?

01CA512.3: Describe network components.

Approximate Hours

Item	Appx Hrs
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO3.1 To understand Routing SO3.2 know Routing algorithms-adaptive and non-adaptive SO3.3 IP protocol and IP address, SO3.4 To understand The Internet Architecture. SO3.5 To understand SMTP protocol	1. OTDR Testing 2. LIU fixing 3. LIU management (pigtail/ fiber patchcord) 4. Media Convertor	**Unit-3:** **1.** Routing, Transport and Application Layers **2.** Packets and Routing **3.** Routing algorithms-adaptive and non-adaptive **4.** IP protocol and IP address, Socket Internetworking, **5.** Flow Control and Congestion Control **6.** TCP and UDP	• **l**earn File transfer and FTP

	5. SFP module 6. Rules of OFC laying 7. 4. Use of tools 8. Crimping Tool 9. Punching Tool 10. Nose plier 11. Wire Stripping and Cable Cutter 12. Multimeter	protocols **7.** The Internet Architecture, **8.** E-mail and SMTP protocol, File transfer and FTP, **9.** Remote login and TELNET **10.** World Wide Web (WWW), HTML and **11.** HTTP protocol.	

SW-3 Suggested Seasonal Work (SW):

- **Assignments:**
  - Explain World Wide Web (WWW),
- **Presentation on** Internet Architecture

01CA512.**4: Use suitable network components transmission media in internal and external networking.**

Approximate Hours

Item	Appx Hrs
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Out comes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO4.1 To Understand		**Unit-4:**	

Cyber Security **SO4.2** To understand Basics of Cryptography **SO4.3** Polygram, Polyalphabetic Substitution, Play fair **SO4.4** To understand Symmetric Key Algorithms. **SO4.5** To understand the Asymmetric Key Cryptography.	1. RJ45 RJ11 RJ12 Cat5 Cat6 Network Cable Tester 2. In-Line Coupler (RJ45 F/F) 3. RJ45 NETWORK SPLITTER ADAPTER 2-way. 4. Sation 5. Configuration/Management of Local Area Network 6. Implementation of file and printer sharing. 7. Installation of ftp server and client. .	**1.** Cyber Security : Introduction, Need for security **2.** Basics of Cryptography **3.** Plain text and Cipher Text, Substitution techniques, **4.** Caesar Cipher, Mono-alphabetic Cipher, **5.** Polygram, Polyalphabetic Substitution, Play fair, **6.** Hill Cipher, Transposition Cipher. Encryption and Decryption **7.** Symmetric Key Algorithms and AES **8.** Brief history of Asymmetric Key Cryptography, **9.** Overview of Asymmetric Key Cryptography. **10.** RSA algorithm. **11.** Overview of Symmetric key Cryptography, Data Encryption Standard (DES).	• Learn about Hill Cipher and Transposition Cipher

SW-4 Suggested Seasonal Work (SW):

- **Assignments:**
  a. Write the process of RSA algorithm
- **Pictorial representation of crypto system**

01CA512. **5. Understand basic principles of information security and its need.**

Approximate Hours

Item	Appx Hrs
Cl	12
LI	12

SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO5.1 To understand Network Security, **SO5.2** To understand Virtual Private Networks **SO5.3** To understand Secure Socket Layer (SSL), **SO5.4 To** Understand IT Act **SO5.5 To** Understand Copyright Act, Patent Law, IPR.	1. Connect the computers in Local Area Network. 2. Configuring Class A IP Address on LAN Connection in Computer LAB and then use following tools: 3. ping, ipconfig, getmac, hostname, nslookup, tracert, arp, pathping, systeminfo. 4. Configure static routing using packet tracer software	**Unit5:** 1. Network Security, Types of Attacks 2. Firewalls and Virtual Private Networks 3. Brief Introduction to TCP/IP, Firewalls, Virtual Private Networks (VPN) 4. Secure Socket Layer (SSL), Transport Layer Security (TLS) 5. Secure Hyper Text Transfer Protocol (SHTTP), 6. Time Stamping Protocol (TSP), Secure Electronic Transaction (SET, Secure Sockets Layer (SSL). 7. E-mail Security Security Policies, Why Policies should be developed, WWW policies 8. Email Security policies, Policy Review Process- Corporate policies-	Learn the process of Patent.

	5. Configure Dynamic routing using packet tracer 6. Configure VLAN using Managed switch Device / Packet tracer 7. Implementation of Subnetting in Class A, B and C Ping between 2 systems using IPv6	Sample Security Policies 9. Publishing and Notification Requirement of the Policies. 10. Information Security Standards-ISO. 11. IT Act, Copyright Act, 12. Patent Law, IPR.	

SW-5Suggested Seasonal Work (SW):

- **Assignments:**
- Explain in detail about E-mail Security Security Policies

- **Other Activities (Specify):**
- Group discussion of important topics.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instruction (LI)	Sessional Work (SW)	Self-Learning (Sl)	Total hour(Cl+SW +Sl)
CT101 At the end of this chapter the student will understand Computer Networks concepts and its uses.	12	12	1	1	15
CT102 At the end of this chapter the student will Understand Network Technologies and protocols	12	12	1	1	15
CT103 At the end of this chapter the student will Describe network components	12	12	1	1	15

CT104 At the end of this chapter the student will Use suitable network components transmission media in internal and external networking.	12	12	1	1	15
CT103 5. At the end of this chapter the student will Understand basic principles of information security and its need.	12	12	1	1	15
Total Hours	60	60	5	5	130

Suggestion for End Semester Assessment

Suggested Specification Table (ForESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Introduction to Computer Networks and networking elements	03	02	03	08
CO-2	Data Communication	03	01	05	09
CO-3	Routing, Transport and Application	03	07	02	12
CO-4	Cyber Security	03	05	05	13
CO-5	Network Security	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A:Apply

The end of semester assessment for autonomous system for AI and DS will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
8. Brainstorming

A. Books:

Suggested Learning Resources:

S. No.	Title	Author	Publisher	Edition & Year
1	Computer Networks & Data Communication Networks	**Rajiv Chopra**	Bhavya books	2014
2	Network Security & Administration by ,	Adesh K. Pandey	S.K. Kataria & Sons	2013

B. Alternative NPTEL/SWAYAM/MOOC Course (if any): NA

Curriculum Development Team

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COs, POs and PSOs Mapping

Course Title: BSc. (IT)
Course Code: 01CA512
Course Title: Computer Network and Security

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer- based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO101 Understand Computer Networks concepts and its uses.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO102 Understand Network Technologies and protocols	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3

CO103 Describe network components	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**1**	**2**	**3**	**3**	**3**	**3**	**2**	**2**
CO104 Use suitable network components transmission media in internal and external networking.	-	-	-	**1**	**1**	**3**	**3**	**3**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**3**	**3**
CO103 5. Understand basic principles of information security and its need.	**1**	**1**	**2**	**2**	**1**	**2**	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**3**

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CL)	Self-Learning (SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO101 Understand Computer Networks concepts and its uses.	SO1.1 SO1.2 SO1.3 SO1.4		Unit-1 1.Introduction to Computer Networks and networking elements 1.1,1.2,1.3,1.4,1.5,1.6,	As mentioned in page number
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO102 Understand Network Technologies and protocols	SO2.1 SO2.2 SO2.3 SO2.4		Unit-2 Data Communication 2.1, 2.2, 2.3, 2.4, 2.5, 2 2.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO103 Describe network components	SO3.1 SO3.2 SO3.3 SO3.4		Unit-3 Routing, Transport and Application Layers3.1,3.2,3.3,3.4,3.5,3.6,	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO104 Use suitable network components transmission media in internal and External networking.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5		Unit-4 Cyber Security 4.1,4.2,4.3,4.4,4.5,4.6, 2	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO103 5. Understand basic principles of Information security and its need.	SO5.1 SO5.2 SO5.3 SO5.4		Unit-5 Network Security 5.1,5.2,5.3,5.4,5.5,5.6	

Semester-V

Course Code: 05CA521

Course Title: Multimedia And Animation

Pre- requisite: Basic knowledge of computers

Rationale: The aim of the course is to introduce to the field of Multimedia with emphasison its use to solve real world problems for which solutions are difficult to express using the traditional algorithmic approach. It explores the essential theory behind methodologies fordeveloping systems that can create new Multimedia technologies like video editing, animation, image editing.

Course Outcomes:

05CA521.1: Demonstrate knowledge of the fundamental principles of multimedia.
05CA521.2: Apply Fonts and image fundamentals.
05CA521.3: Fundamentals of Audio and Video
05CA521.4: Familiarize knowledge representation in Animation.
05CA521.5: Comprehend the use of 2D and 3D Animation.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
DSE	05CA521	Multimedia And Animation	4	0	1	1	6	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop,field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous

guidance and feedback ofteacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Course	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment	Total Marks (PRA+ESA)
			Class/HomeAssignment5 number 3 markseach (CA)	Class Test2 (2 best out of 3) 10 markseach (CT)	Seminar one	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	(ESA)	
DSE	05CA521	Multimedia And Animation	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

05CA521**.1:** Demonstrate knowledge of the fundamental principles of multimedia.

Approximate Hours

Item	AppX Hrs
Cl	13
LI	0
SW	1
SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO1.1 Understand the concept of Multimedia **SO1.2** Compare types of Multimedia. **SO1.3** Apply types of Multimedia in real life.	.	**Unit-1.0 Introduction to Multimedia** 1.1 What is multimedia 1.2 Multimedia and hypermedia 1.3 Components of multimedia – 1.4 textual, images, graphics, 1.5 animation, audio, video 1.6 Linear and Non-Linear Multimedia 1.7 Application of Multimedia, 1.8 Requirement of Multimedia System. 1.9 Multimedia Authoring. Multimedia Authoring Metaphors, 1.10 Multimedia Production. Multimedia Presentation and tools. 1.11 1.6 Automatic Authoring. Editing and Authoring Tools. 1.12 Multimedia Hardware. 1.13 Compression & Decompression	1. Search devices using Multimedia 2. Apps using Multimedia.

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Use of authoring tool.
ii. Use of latest Ms. Word
iii. Applications of Multimedia.

05CA5212**:** Apply Fonts and image fundamentals.

Approximate Hours

Item	AppX Hrs
Cl	14
LI	0
SW	1
SL	1
Total	16

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**
SO2.1 Understand the concept of Fonts and Hypertext. **SO2.2** Use the image fundamentals **SO2.3** Demonstrate the use of image editing software.	.	**Unit-2.0 Fonts and Hypertext** 2.1.**2.1** Usage of text in Multimedia, 2.2. Families and faces of fonts. Outline fonts. bitmap fonts 2.3. International character sets and hypertext. 2.4. Digital font's techniques. 2.5. Image fundamentals: Image formats, 2.6.Bitmap and Vector 2.7.Color Models, Color palettes, 2.8.2D Graphics 2.9.image Compression and 2.10. File Formats: GIF, JPEG, JPEG 2000, PNG, TIFF, EXIF, PS. PDF, 2.11. Basic image Processing. 2.12. Use of image editing software 2.13. Photo Retouching. Image resolution. Color. 2.14. Raster and Vector	1. How different fonts are used. 2. Apply different image editing softwares.

		Graphics.	

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Difference between fonts and faces.
ii. Difference between bitmap and raster images.
iii. Apply photoshop to edit an image.

05CA5213**:** Fundamentals of Audio and Video

.

Approximate Hours

Item	AppX Hrs
Cl	14
LI	0
SW	1
SL	1
Total	16

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**
SO3.1 Understand the concept of Audio **SO3.2** Understand the concept of video. **SO3.3** Apply various audio and video tools.	.	**3.1. Audio fundamentals: Audio quality, formats and devices** 3.2. Digitization of sound. frequency and bandwidth, 3.3. decibel system. data rate 3.4. audio file format, Sound synthesis. 3.5. Musical Instrument Digital Interface (MIDI), wavetable 3.6.. Compression and transmission of audio on Internet, 3.7. Editing and adding sound to multimedia project, Audio software and hardware. 3.8. Video Fundamental:	1. Compare and analyze audio and video editing tools.

		Video basics. Formats. how video works 3.9. Types of video signals - component. Composite and S-video. 3.10. Analog video, Digital video, 3.11. Broadcast Video Standards (NTSC, PAL), 3.12. Video Recording and Tape formats. Shooting and editing Video, 3.13. Video compression and File formats (JPEG.MPEG), 3.14. Video software and hardware.	

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Application of audio software.
ii. Application of the video software.
iii. Difference between different video standards.

05CA521**.4:** Familiarize knowledge representation in Animation.

Approximate Hours

Item	AppX Hrs
Cl	11
LI	0
SW	1
SL	1
Total	13

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**

SO4.1 Understand the concept of Animation. **SO4.2** Use of frames and slots. **SO4.3** Apply animation software.	.	**Unit-4.0 Animation** 4.1. Introduction and definition of animation, 4.2. Principles Types and uses. 4.3. Methods and Techniques of animation, Basic animation 4.4. Text and image animation. 4.5. Time line construction and management. 4.6. Masking Motion and 4.7. shape Tweening. 4.8. Morphing 4.9., Onion skinning. Animation File Formats. 4.10. Keyframe animation, 4.11. Working with symbols and Animation Software	1. Compare and analyze all animation techniques.

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Questions based on frames.
ii. Questions based on motion and shape tween.
iii. Questions based on text and image animation.

05CA5215**:** Comprehend the use of 2D and 3D Animation.

Approximate Hours

Item	AppX Hrs
Cl	08
LI	00
SW	02
SL	01
Total	11

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**

SO5.1 Understand the concept of 2D animation. **SO5.2** Understand the concept of 2D animation.	.	**Unit-5.0 Basics of 2D and 3D animation.** 5.1. Overview of 2D animation and its features, 5.2. Drawing tools. Types of panels. transformation, property panel 5.3. Working with objects. group, bitmap 5.4. Controlling Movie clips with code. Working with Dynamic Text fields and Input Text Fields. 5.5. Loading external content and other movies. Dynamic preloaders 5.6. Interactivity with code. Difference between 2D and 3D animation 5.7. Tweening and motion along a path, Controlling movie playback. 5.8. Text and hyperlink. Adding sound and movie. Introduction to 3D animation and its basic concepts, and its applications.	1. Compare and analyze all 2D and 3D animation techniques.

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Difference between 2D and 3D animation,
ii. Use of tweening.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
05CA5211: Demonstrate knowledge of the fundamental principles of multimedia	13	01	01	15
05CA521.2: Apply Fonts and image fundamentals.	14	01	01	16
05CA521.3: Fundamentals of Audio and Video	14	01	01	16
05CA521.4: Familiarize knowledge representation in Animation	11	01	01	13
05CA521.5: Comprehend the use of 2D and 3D Animation	08	01	01	10
Total Hours	**60**	**5**	**5**	70

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	**Introduction to Multimedia**	03	02	03	08
CO-2	**Fonts and Hypertext**	03	01	05	09
CO-3	**Audio fundamentals**	03	07	02	12
CO-4	**Animation**	03	05	05	13

CO-5	**Basic 2D and 3D animation**	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Introduction to Portland cement will be held with writtenexamination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks.

Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to cement plant
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT,Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

A. Books:

S. No.	Title	Author	Publisher	Edition & Year
1	"Multimedia Making It Works	Tay Vaughan	Tata McGraw-Hill.	9th edition 2008
2	Multimedia Systems	Rajneesh Aggarwal & B. B Tiwari	Excel Publication. New Delhi	3rd Edition 2002
3	Lecture note provided by Dept. of CS&E, AKS University, Satna.			

Curriculum Development Team

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CO, PO and PSO Mapping

Course Title: B.Sc. (IT)
Course Code: 05CA521
Course Title: **Multimedia and Animation**

	Program Outcomes												Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PS0 5
Course Outcomes	**Computational information**	**Difficulty Analysis**	**Drawing / Improvement of Solutions**	**Accomplish Investigations of Compound Computing Troubles**	**: Current Implement Procedure**	**Proficient Principles**	**Ultimate Education**	**Mission Administration**	**Announcement Usefulness**	**Public & Ecological Alarm**	**Personality & Group Job**	**Modernization and Private Enterprise**	**An ability to enhance the application of knowledge of theory subjects in diverse fields**	**Develop language proficiency to handle corporate communication demands.**	**Preparing students in various disciplines of technologies such as computer applications, computer networking, software engineering, JAVA, database concepts and programming**	**In order to enhance programming skills of the young IT profession the concept project development using the technologies learnt during the semester has been introduced**	**Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.**
CO.1 Demonstrate knowledge of the fundamental principles of neural network.	3	2	3	3	2	1	1	1	1	2	1	3	2	2	3	3	2
CO2. Apply Fuzzy Logic.	2	3	3	3	2	2	1	2	1	2	1	3	2	3	2	3	3
CO3. Use various AI algorithms	2	2	2	3	2	2	2	1	1-2	1	1	3	2	2	2	3	2
CO4. Familiarize knowledge representation in intelligent system	2	2	3	2	2	2	1	1	1	1	2	3	2	2	3	2	2
CO5. Comprehend the use of learning system	2	2	3	2	2	2	1	1	1	1	1	3	2	2	3	2	3

Course Curriculum Map

POs & PSOs /*-No.	COs No.& Titles	SOs No.	Laboratory Instruction(LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO: 1,2,3,4,5,6,7, 8,9,10,11,12 PSO:1,2,3,4	CO.1 Demonstrate knowledge of the fundamental principles of neural network.	SO1.1 SO1.2 SO1.3		Unit-1 Introduction to Multimedia 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9	As mentioned in page number _ to _
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO:1,2,3,4	CO.2 Apply Fuzzy Logic.	SO2.1 SO2.2 SO2.3		Unit-2 Fonts and Hypertext 2.1, 2.2, 2.3, 2.4, 2.5, 2.6,2.7,2.8,2.9,	
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO:1,2,3,4	CO.3 Use various AI algorithms	SO3.1 SO3.2 SO3.3		Unit-3: Audio fundamentals 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,3.11,3.12,3.13	
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO:1,2,3,4	CO.4 Familiarize knowledge representation in intelligent system	SO4.1 SO4.2 SO4.3		Unit-4 : Animation 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.1	
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO:1,2,3,4	CO.5 Comprehend the use of learning system	SO5.1 SO5.2		Unit5: Basic 2D and 3D animation 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.1 5.11,5.12,5.13,5.14,5.16,5.17,5.18	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application& Information Technology

Curriculum of BSC (IT) (Bachelor of Science)

(Revised as on 01 August 2023)

Semester-V

Course Code: **05CA522**

Course Title: Design and Analysis of Algorithms

Pre- requisite: Data Structures and

Rationale: Study of this subject help students to understand different Problem-solving skills like divide and conquer, Dynamic Programming, Greedy Strategy and Back Tracking. These problem-solving skills will develop intelligence in student to solve real time problems of society and Industry.

Course Outcomes:

CO.1. Demonstrate knowledge of Graph and its applications.
CO.2. Apply greedy approach and Huffman coding.
CO.3. Use various divide and conquer algorithm and recurrence relation
CO.4. Familiarize with the dynamic programming approach
CO.5. Comprehend the use of concept of computation and network flow.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
DES	05CA522	Design and analysis of algorithms	4	0	1	1	6	4

Legend: CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) And others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations Using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self-Learning,
C: Credits.
Note: SW & SL has to be planned and performed under the continuous guidance And feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Course	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Cla	Class Test2(2	Seminar one(SA)	Class Activityany one (CAT	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		

						)				
PC C	05CA522	Design and Analysis of Algorithms	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

05CA522.1: Demonstrate knowledge of Graph and its applications.

Approximate Hours

Item	Appx Hrs.
Cl	9
LI	0
SW	1
SL	1
Total	11

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**
SO1.1 Understand the concept of Graph **SO1.2** Compare DFS and BFS **SO1.3** Analyze connectivity of graphs.	.	**Unit-1.0** Applications of Graph Search 1.1. Intro to Graph Search algorithms 1.2. BFS 1.3. Application and example of BFS 1.4. DFS 1.5. Application and Example of DFS 1.6. Checking if an undirected graph is 2-edge connected 1.7. Based Examples	1. Discuss terminology related to Graph. 2. See applications of graph.

		1.8. Checking if a directed graph is strongly connected 1.9. Based Examples	

SW-1 Suggested Sessional Work (SW):

Assignments:

I. Numerical based on BFS.
II. Numerical based on DFS
III. Numerical based on Graph

05CA522: Apply greedy approach and Huffman coding.

Approximate Hours

Item	Appx. Hrs.
Cl	10
LI	0
SW	1
SL	1
Total	12

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO2.1 Understand the Concept of Greedy approach. **SO2.2** Use of Kruskal and prim algorithms. **SO2.3** Demonstrate the use of Huffman coding.	.	**Unit-2.0** Greedy algorithms 2.1. Introduction to the greedy paradigm 2.2. Some Greedy algorithms 2.3. Examples of activity selection 2.4. Examples of deadline scheduling 2.5. fractional knapsack 2.6. based example 2.7. Kruskal's algorithm for minimum spanning trees 2.8. Based examples 2.9. Huffman coding 2.10. Based examples	3. Prim's algorithm for minimum spanning trees. 4. Examples where greedy algorithms are not optimal.

SW-1 Suggested Sessional Work (SW):

Assignments:

I. Other algorithms based on Greedy approach.
II. Numerical based on fractional knapsack.
III. Numerical based on Huffman Coding.

05CA522.3: Use various divide and conquer algorithm and recurrence relation.

Approximate Hours

Item	Appx. Hrs.
Cl	13
LI	0
SW	1
SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
O3.1 Understand the concept of Divide and conquer **SO3.2** Use various Divide and conquer algorithms. **SO3.3** Solve recurrence relation		**Unit-3.0** Divide and Conquer 3.7. Intro to Divide and conquer approach 3.8. Explain why the divide and conquer paradigm is useful. 3.9. Illustrate the paradigm through integer multiplication. 3.10. Writing recurrence relations and solving them. 3.11. Various methods to solve recurrence relation -I 3.12. Various methods to solve recurrence relation -II 3.13. Examples based on recurrence relation 3.14. Further examples from geometry – domination number of a set of points, 3.15. Identifying maximal points, closest pair of points. 3.16. Linear time	1. Solve some recurrence relations. 2. Modify Discussed algorithms (e.g., dividing into three parts instead of two parts, or two unequal parts, etc.)And analyze using recurrences. 3. Some Elementary exercises on expectation calculation.

		algorithm for finding the median. 3.17. Randomized divide and conquer algorithms: 3.18. randomized quicksort and 3.19. selection	

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Numerical based on Fuzzy logic.
ii. Numerical based on Membership Function.
iii. Numerical based on Genetic algorithm.

05CA522.4: Familiarize with the dynamic programming approach.

Approximate Hours

Item	Appx. Hrs.
Cl	10
LI	0
SW	1
SL	1
Total	12

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO4.1 Understand the concept of Dynamic Programming **SO4.2** Understand the concept of shortest paths **SO4.3** Analyze various dynamic programming algorithms.	.	**Unit-4.0** Dynamic Programming and shortest paths 4.7. Computing Fibonacci numbers and why divide-and- conquer is not a good idea. Idea of storing function calls, tables 4.8. Notion of sub problems and optimal substructure 4.9. Illustration through subset sum 4.10. (integer) knapsack 4.11. longest increasing subsequence 4.12. longest	2. Exercises on dynamic programming.

		common subsequence 4.13. matrix chain multiplication 4.14. Dijkstra's algorithm for single-source shortest paths	
		4.15. Bellman-Ford for SSSP with negative weights 4.16. Floyd Warshall for APSP	

SW-1 Suggested Sessional Work (SW):

Assignments:

I. Questions based on frames.
II. Questions based on scripts.
III. Questions based on formal logic.

05CA522.5: Comprehend the use of concept of computation and network flow.

Approximate Hours

Item	AppX Hrs
Cl	18
LI	00
SW	02
SL	01
Total	21

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**
SO5.1 Understand the concept of Network flows. **SO5.2** Understand the concept of computations.	.	**Unit-5.0** Network flows & Intractability 5.7. The maximum s-t flow problem in capacitated networks 5.8. Ford Fulkerson algorithm or maximum flow 5.9. Max-flow min-cut theorem 5.10. integrality of maximum flow for integral capacities	1. Exercises on reductions 2. Exercises on NP-Completeness. 3. Problems which are NP-hard but not in NP. 4. Examples of poly time reductions.

		5.11. Applications of max flow to maximum bipartite matching, max disjoint paths 5.12. Models of computation	
		5.13. Turing machines 5.14. PRAM model 5.15. Brief discussion on other models of computation e.g. PRAM model 5.16. Memory Hierarchy 5.17. Notion of polynomial time computation 5.18. Polynomial time reductions 5.19. Yes and No instances of decision problems 5.20. Decision vs optimization. 5.21. NP as a class of problems with Yes certificates which can be efficiently checked 5.22. NP-hardness and Cook-Levin theorem (just the statement). 5.23. NP-completeness. 5.24. Examples of Reductions.	

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Different types of learning techniques.
ii. Use of Dempster-Shafer Theory of Evidential reasoning

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
CO.1 Demonstrate knowledge of Graph and its applications.	09	02	01	13

CO2. Apply greedy approach and Huffman coding.	10	02	01	13
CO3. Use various divide and conquer algorithm and recurrence relation	13	02	01	16
CO4. Familiarize with the dynamic programming approach	10	02	01	13
CO5. Comprehend the use of concept of computation and network flow.	18	02	01	21
Total Hours	60	10	5	66

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Applications of Graph Search	03	02	03	08
CO-2	Greedy algorithms	03	01	05	09
CO-3	Divide and Conquer	03	07	02	12
CO-4	Dynamic Programming and shortest paths	03	05	05	13
CO-5	Network flows & Intractability	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Introduction to computer science will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit to IT Industry
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter,

WhatsApp, Mobile, Online sources)

9. Brainstorming

Suggested Learning Resources:

C. Books:

S.No.	Title	Author	Publisher	Edition &Year
1	Algorithm Design	Jon Kleinberg and Éva Tardos	Pearson.	1st Edition
2	Algorithms	Sanjoy Dasgupta, Christos Papadimitriou, Umesh Vazirani	MIT Press	3rd Edition
3	Introduction to Algorithms	Thomas H Cormen, Charles E Lieserson, Ronald L Rivestand Clifford Stein	McGraw-Hill	2nd Edition
4	Algorithm Design: Foundations, Analysis, and Internet Examples	Michael TGoodrich and Roberto Tamassia	Wiley	2nd Edition

D. Alternative NPTEL/SWAYAM/MOOC Course (if any):

S. No.	NPTEL Course Name	Instructor	Host Institute
1.	Design and Analysis of Algorithms	Prof. Madhavan Mukund	Chennai Mathematical Institute
2.	Design and Analysis of Algorithms	Prof. Abhiram Ranade	IIT Bombay

Curriculum Development Team

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21. Mr. Vinay Kumar Dwivedi, Assistant Professor, Department of Computer Science and Engineering.
22. Dr. Pinki Sharma, Assistant Professor, Department of Computer Science and Engineering.
23. Ms. Pushpa Kushwaha, Assistant Professor, Department of Computer Science and Engineering.

CO, PO and PSO Mapping

Course Title: B.Sc.(IT) Course
Code : 05CA522
Course Title: Design and Analysis of Algorithm

Course Outcomes	Program Outcomes												Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PS0 5
	Computational information	Difficulty Analysis	Drawing / Improvement of Solutions	Accomplish Investigations of Compound Computing Troubles	: Current Implement Procedure	Proficient Principles	Ultimate Education	Mission Administration	Announcement Usefulness	Public & Ecological Alarm	Personality & Group Job	Modernization and Private Enterprise	An ability to enhance the application of knowledge of theory subjects in diverse fields	Develop language proficiency to handle corporate communication demands.	Preparing students in various disciplines of technologies such as computer applications, computer networking, software engineering, JAVA, database concepts and programming	In order to enhance programm skills of th young IT profession the concep project developme i using th technologi learnt dur the semest has been introduced	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
O.1 Demonstrate nowledge of Graph d its applications.	3	2	3	3	2	1	1	1	1	2	1	3	2	2	3	3	2
O2. Apply greedy proach and uffman coding.	2	3	3	3	2	2	1	2	1	2	1	3	2	3	2	3	3
O3. Use various vide and conquer gorithm and currence relation	2	2	2	3	2	2	2	1	1-2	1	1	3	2	2	2	3	2
O4. Familiarize with e dynamic ogramming proach	2	2	3	2	2	2	1	1	1	1	2	3	2	2	3	2	2
O5. Comprehend the e of concept of Mputation and twork flow.	2	2	3	2	2	2	1	1	1	1	1	3	2	2	3	2	3

Course Curriculum Map

POs & PSOs /*-No.	COs No.& Titles	SOs No.	Laboratory Instruction(LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO: 1,2,3,4,5,6,7, 8,9,10,11,12 PSO:1,2,3,4	CO.1 Demonstrate knowledge of Graph and its applications	SO1.1 SO1.2 SO1.3		Unit-1.0 Applications of Graph Search 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9	As mentioned in page number _ to _
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO:1,2,3,4	CO.2 Apply greedy approach and Huffman coding	SO2.1 SO2.2 SO2.3		Unit-2 Greedy algorithms 2.1, 2.2, 2.3, 2.4, 2.5, 2.6,2.7,2.8,2.9,	
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO:1,2,3,4	CO.3 Use various divide and conquer algorithm and recurrence relation	SO3.1 SO3.2 SO3.3		Unit-3: Divide and Conquer 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,3.11,3.12,3.13	
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO:1,2,3,4	CO.4 Familiarize with the dynamic programming approach	SO4.1 SO4.2 SO4.3		Unit-4 : Dynamic Programming and shortest 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.1	
PO: 1,2,3,4,5,6, 7,8,9,10,11, 12 PSO:1,2,3,4	CO.5 Comprehend the use of concept of computation and network flow	SO5.1 SO5.2		Unit5: Network flows & Intractabili 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.15.11,5.12,5.13,5.14,5.16,5.17,5.18	

A K S University

Faculty of Engineering and Technology

Department of Computer Science & Engineering

Curriculum of B.Tech. (Computer Science & Engineering) **Program**

(Revised as on 01 August 2023)

Semester-V

Course Code: 06CA552

Course Title: Field Project/Internship/Seminar/Workshop

Pre- requisite: Student should have knowledge of programming languages, Software Engineering, and Many more tools and framework.

Rationale:

- To apply the knowledge and skills learnt in previous semesters, to solve real life industrial / engineering / professional problems.
- To modify/ improve the existing engineering / professional systems.
- To develop systems / components / methods / processes / resources to cater the needs of the nearby small scale / medium industry.
- To learn to solve real life engineering / professional problems which often have many aspects to be considered and addressed.

Course Outcomes:

06CA552.1: - The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.
06CA552.2: - The student will be able to implement the project plan and manage the project.
06CA552.3: - The student will be able to present the completed project work.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Project	06CA552	Field Project/Internship/Seminar/Workshop	0	4	0	0	4	2

The Course on Project Work consists of five phases: -

	Description of phases	Learn Hrs.
1	Literature / industry's need survey and finalization of topic / title	15 Hrs
2	Detailed planning of the project work	
3	Implementing the detailed project plan	60 Hrs
4	Managing the project activities	
5	Reporting of the project work output/outcome / prototype	15 Hrs
	Total	90 Hrs

General Guidelines for Project Work

- The project topics should be related to concerned branch of engineering / profession, but should not be the exact content of the curriculum taughtin the discipline.
- Student's project topics should be preferably 'real life' topics. It means the project topics should have substantial element of uncertainty, complexity and multi-disciplinary-ness which can be coped up by the students. These elements offer opportunities to students to apply engineering/ professional knowledge in real life settings, solve real life problems and to take real life decisions. As a project guide, concerned teacher should ensure these by suitably altering / framing / reframing the statement of topic / title.
- The project topics should be such that students can get opportunity to refer IS codes, Manuals, Handbooks, norms and standards, opportunity to conduct standard tests, and opportunity to operate modern laboratory equipment's following SOPs.
- For student's interest, active participation and ownership in the project work, their self-motivation is necessary. Therefore, students should be actively involved in finalizing the topic of project.
- Students should be asked to conduct a brief review of literature for problems and issues in their engineering / professional areas of interest, where they think they can contribute effectively. The project guide should facilitate them in this regard, through his/her expertise and experience.
- Every student group should be asked to propose at least three topics oftheir interest. The topics proposed by student project groups should be assessed bythe facilitator-teacher on following three criteria: -
    - **The work on the topic should be theoretically and practically feasible.**
    - **The project work on the topic should be completed within approx. Three and half months.**
    - **Availability of required resources should be certain. Cost of project work should also be bearable.**
- Normally, students' project works should be carried out in small groups (1 to 2 students).
- All faculty members of department should be engaged as project guides. Every faculty member should be project guide of at least one student project group.
- Normally, project guides should be assigned to the students through lottery system and students under each faculty should be asked to formtheir small groups.

COs, POs and PSOs Mapping

Course Title: BSc IT
Course Code: 06CA552
Course Title: Field Project/Internship/Seminar/Workshop

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1: The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.	2	3	3	2	3	2	3	1	3	1	3	3	2	3	3	1	2
CO 2: The student will be able to implement the project plan and manage the project.	2	3	3	2	3	2	3	1	3	1	3	3	2	2	2	2	3
CO 3: The student will be able to present the completed project work.	2	2	3	1	3	2	2	1	3	1	3	3	2	3	2	2	2

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.	-	-	-	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: The student will be able to implement the project plan and manage the project.	-	-	-	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 3: The student will be able to present the completed project work.	-	-	-	

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Semester-VI

Course Code: **01CA612**

Course Title: Linux Operating System

Pre-requisite: **Student should have basic knowledge of Operating System.**

Rationale: The aim of the course is teaching the students to understand the basic principles of Linux OS and also help them understand its utilities. The syllabus includes shell programming, a control
Section, and general coding. Linux OS supports programming in various languages like C, C++, Java, etc.

Course Outcomes:

01CA612.1: Student will understand the basic concepts of Linux OS.
01CA612.2: Student will learn how to install and configure Linux on physical or virtual machines.
01CA612.3: Student will acquire proficiency in using the Linux command-line interface
01CA612.4: Student will learn how to manage user accounts and groups on a Linux system.
01CA612.5: Student will understand Linux security mechanisms

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Major	01CA 612	Linux Operating System	4	4	1	1	10	6

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performance laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Course Code	Course Title	Scheme of Assessment (Marks)		
			Progressive Assessment (PRA)	End Semester Assessment	Total Marks

			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	**(ESA)**	(PRA+ ESA)
Major	01CA612	Linux Operating system	15	20	5	5	5	50	50	100

Practical

Board of Study	**Couse Code**	**Course Title**	**Scheme of Assessment (Marks)**						
			Progressive Assessment (PRA)					**End Semester Assessment (ESA)**	**Total Marks** (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	**Viva1 (5)**	**Viva2 (5) (SA)**	**Class Attendance (AT)**	**Total Marks (CA+CT+SA+CAT+AT)**		
Major	01CA612	Linux Operating system	35	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

01CA612.1: **Student will understand the basic concepts of Linux OS.**

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	26

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Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO1.1 Understand about history and introduction of Linux. **SO1.2 Understand** about Basic Architecture, Different Flavor **SO1.3 Understand** about CUI And GUI, LINUX Vs Windows File System and Blocks **SO1.4 Understand** about Installation of Linux. **SO1.5 Understand** about Essential Tools: Log in	1. How to install Linux. 2. Linux Directory Commands: pwd, mkdir, rm -rf, ls, cd,cd /,cd~ 3. Linux File Commands: touch, cat, cal > 4. , cat >>, rm,cp, mv, rename 5. Linux Permission Commands: su, id, 6. Linux Permission useradd,passwd,	**Unit-1.** **(11Lectures)** 1.1. History, what is LINUX 1.2. Basic Architecture, Different Flavor, 1.3. CUI And GUI, 1.4. LINUX Vs Windows 1.5. File System and Blocks, 1.6. Installation of Linux. 1.7. Essential Tools:	1. 1.Search History of Linux and run basic commands.
And Switch Users, Create and Edit Text Files, Delete. **SO1.6 Understand** Copy, and Move Files and Directories, Create Hard and Soft Links **SO1.7 Understand** about Archive, File Compression **SO1.8 Understand** about Decompression using tar, star, gzip, and bzip2.		Log in and Switch 1.8. Users, Create and Edit Text Files, Delete, 1.9. Copy, and Move Files and 1.10. Directories, Create Hard and Soft Links 1.11. Archive, File Compression Decompression 1.12. using tar, star, gzip, and bzip2.	

SW-1Suggested Sessional Work (SW):

a. Assignments:

(i) Describe basic architecture of Linux.

b. Presentation

c. Pictorial representation of Installation of Linux.

01CA612.2: **Student will learn how to install and configure Linux on physical or virtual machines.**

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	14

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Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
2.1 Understand the boot, reboot and shutdown services. **SO2.2 Discuss** about start and stop vm. **SO2.3 Demonstrate** ip configuration. **SO2.4 Discuss** about list, create, delete partition. **SO2.5 Discuss** about mount and unmount file system. **SO2.6 Discuss** about vFAT, ext4, xfs File Systems, **SO2.7 Discuss** about Extend Existing Logical Volumes, **SO2.8 Discuss** about Create and Manage **SO2.8 Discuss** about Access Control Lists	2.1 Linux Permission Commands: groupadd, chmod, groupdel, chown, chgrp 2.2 Linux File Content Commands: head, tail, tac,more, less, 2.3 Linux Filter Commands:grep, cat, cut, grep 2.4 Linux Filter Commands:comm, sed, tee, tr, uniq, wc,od, sort, diff. 2.5 Diffrentiate Vfat, ext4, xfs. 2.6 Configure Local system.	**Unit-2** **(09 Lectures)** Services 2.1. Boot, Reboot, and Shut Down 2.2. Start and Stop Virtual Machines, 2.3. IP Configuration, Start, Stop, and 2.4. Check the Status of Network Services. 2.5. Configure Local Storage: 2.6. List, Create, and Delete Partitions, Logical Volumes, and 2.7. Swap. File System Configuration: 2.8. Create ,mount,unmount 2.9. Vfat,ext4, xfs file system. 2.10. Extend exixting Logical Volumes. 2.11. Create and manage 2.12. Access Control list.	1. How to configure file system and how to work services by practical.

SW-2 Suggested Seasonal Work (SW):

a. Assignments:

(i) How to work boot, reboot, and shutdown services in Linux.

b. Presentation

c. Pictorial representation of creating partition in Linux:

01CA612**.3:** Student will acquire proficiency in using the Linux command-line interface.

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	12
SW	1
SL	1

Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
O3.1 Understand the Shell, Types of Shell, Shell Variable, Keywords, Environment Variable **SO3.2 Discuss** about shell script. **SO3.3 Discuss** about For Loop, While Loop, Until Loop, **SO3.4 Discuss** about if statements. **SO3.5 Discuss** about case statements. **SO3.6 Discuss** about Create, Delete, Modify Local User Accounts **SO3.7 Discuss** about Create, Delete, Modify Local Groups and Group Memberships. **SO3.8 Discuss** about grep, egrep, sed, cut, **SO3.9 Discuss** about paste, sort, split, **SO3.10 Discuss** about write, mail, mesg, wall.	3.1 Linux Utility Commands: find, bc, locate, date, cal, 3.2 Linux Utility Commands: sleep, time, df, mount, 3.3 Linux Utility Commands: exit,clear, gzip, gunzip. 3.4 Linux Networking Commands: ip,ssh, mail, ping, host 3.5 Commands grep,egrep 3.6 Create user group with permissions.	**Unit-3: Shell Programming: (09 Lectures)** 3.1. Shell, Types of Shell, Shell Variable, Keywords, Environment Variable 3.2. Shell Script, Parameter Passing, 3.3. Positional Parameter & Shifting, 3.4. For Loop, While Loop, Until Loop, 3.5. If Statement 3.6. Case Statement. **User and Group Management:** 3.7. Create, Delete, Modify Local User Accounts **3.8.** Create, Delete, Modify Local Groups and Group Memberships. **Text Manipulation:** 3.9. grep, egrep, sed, cut, 3.10. paste, sort, split, 3.11. User to User Communication: 3.12. write, mail, mesg, wall.	i. Create shell script and run in vi editor.

SW-3 Suggested Seasonal Work (SW):

a. Assignments:

(i) Write a shell program using for loop.

b. Presentation

c. Pictorial representation of Linux commands:

01CA612.4: Student will learn how to manage user accounts and groups on a Linux system.

Approximate Hours

Item	Appx. Hrs.
Cl	12

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LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO4.1 Understand the concept of security management. **SO4.2 Discuss** about firewall and iptables. **SO4.3 Discuss** about set enforcing and permissive modes. **SO4.4 Discuss** process and its types. **SO4.5 Discuss** about process command **SO4.6 Discuss** about scheduling command. **SO4.7 Discuss** about wait and background jobs. **SO4.8 Discuss** about pattern scanning **SO4.9 Discuss** about BEGIN and END Pattern **SO4.10 Discuss** about awk functions.	4.1 Edit Crontab file: towall message on system on particular time automatically. 4.2 Vi editor: Create file, edit, save and quit. 4.3Vi editor: Highligting the searched term within a file. cut, yank,undo 4.4.Process command ps,kill, nice 4.5Scheduling commands at,crontab 4.6 Awk Arithmetic. .	**Unit-4 :** **(10 Lectures)** Security Management: 4.1.Configure Firewall, firewall-config, 4.2.firewall-cmd, iptables, 4.3. Set Enforcing and Permissive Modes for SElinux. Process: 4.4.Process, Types, 4.5. Process Command: ps, kill, nice. 4.6. Scheduling Commands: at, crontab, sleep 4.7. wait, Back Ground Jobs. 4.8. AWK: Pattern Scanning 4.9. BEGIN and END Pattern 4.10. awk Arithmetic, Variables, 4.11. Operations and 4.12. Function.	i. Configure firewall and process command

SW-4 Suggested Sessional Work (SW):

Assignments:

PresentationWrite about process command.

(i) Write about awk command.

c. Pictorial representation of configure firewall in Linux

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01CA612.5: Comprehend the use of learning system.

Approximate Hours**Item**	**Appx. Hrs**
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**
SO5.1 Understand the concept of Student will understand Linux security mechanisms **SO5.2** Demonstrate theuse of Webhosting, FTP **SO5.3** Demonstrate the use **TELNET, Traceroute** SO5.4 Discuss about DNS, Linux **SO5.5** Discuss about the Cloud. Introduction to Cluster and Site **SO5.6** Discuss about the Docker Container **SO5.6** Discuss about the OpenShift, **SO5.6** Discuss about the Python,scripting language	.	**Unit-5.0** **IPC & Socket Programming:** 5.1. Student will understand Linux security mechanisms, 5.2. Webhosting, 5.3. FTP, 5.4. 5.3.TELNET, 5.5. Traceroute, 5.6. DNS, 5.7. Linux and Cloud. 5.8. Introduction to Cluster and Site 5.9. Docker Container, 5.10. OpenShift, Kubernetes, Ansible. 5.11. Azure, 5.12. introduction Scripting Language Python.	1. Search and analyze socket programming.

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Different types of learning techniques.

b. Presentation:

c. Other Activities (Specify): Group discussion on important topics.

Brief of Hours suggested for the Course Outcome

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Course Outcomes	Class Lecture (Cl)	Laboratory Instruction (LI)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
01CA612.1**: Student will understand the basic concepts of Linux OS.**	**12**	**12**	**1**	**1**	**26**
01CA612.2 **Student will learn how to install and configure Linux on physical or virtual machines.**	**12**	**12**	**1**	**1**	**26**
01CA612.3 **Student will learn how to manage user accounts and groups on a Linux system.**	**12**	**12**	**1**	**1**	**26**
01CA612.4 **Student will learn how to manage user accounts and groups on a Linux system.**	**12**	**12**	**1**	**1**	**26**
01CA612.5 **Student will understand Linux security mechanisms**	**12**	**12**	**1**	**1**	**26**
Total Hours	**60**	**60**	**05**	**05**	**130**

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Unit-1	03	02	03	08
CO-2	Unit-2	03	01	05	09
CO-3	Unit-3	03	07	02	12
CO-4	Unit-4	03	05	05	13
CO-5	Unit-5	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for autonomous system for AI and DS will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
8. Brainstorming

Suggested Learning Resources:

Books:

S. No.	Title	Author	Publisher	Edition & Year
1	Unix shell programming	Y Kanetkar.	BPB Publications	6th edition
	The 'C' Odyssey Unix –The open Boundless C	Meeta Gandhi, Tilak Shetty and Rajiv Shah	BPB Publications	3rd Edition

Curriculum Development Team

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COs, POs and PSOs Mapping

Course Title: B.Sc. (IT)
Course Code: 01CA612
Course Title: Linux Operating System

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO1 Student will understand the basic concepts of Linux OS.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO2 Student will learn how to install and configure Linux on physical or virtual machines.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO3 Student will acquire proficiency in using the Linux command-line interface	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3
CO4: Student will learn how to manage user accounts and groups on a Linux system.	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2	2
CO.5: Student will understand Linux security mechanisms	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO1: Student will understand the basic concepts of Linux OS.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	Unit-1 : Introduction to Linux operating system 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO2: Student will learn how to install and configure Linux on physical or virtual machines	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5	Unit-2 : Services 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9,2.10,2.11,2.12,2.13,2.14	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3: Student will acquire proficiency in using the Linux command-line interface	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5	Unit-3 **:** Shell Programming: 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO4: Student will learn how to manage user accounts and groups on a Linux system	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5	Unit-4: Security Management 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO5: Student will understand Linux security mechanisms	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5	Unit-5 : IPC & Socket Programming 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8	

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Semester-VI

Course Code: **05CA623-A**

Course Title: **Software Engineering**

Pre- requisite: Basics knowledge of programming

Rationale: Software engineering is important because it helps create high-quality Software that meets user needs and is easy to maintain.

Course Outcomes:

On successful completion of this course, the students will be able to:

05CA623-A.l Students should be familiar with various phases of the software development process, including requirements analysis, design, implementation, testing, deployment, and maintenance.

05CA623-A.2 Learn how to design software systems, considering factors such as modularity, scalability, and maintainability. Understand architectural patterns and their applications.

05CA623-A.3 Develop strong programming skills in relevant languages and frameworks. This includes understanding data structures, algorithms, and design patterns.

05CA623-A.4 Understand the challenges and strategies associated with maintaining and evolving software systems over time. Understand the importance of quality assurance in software development.

05CA623-A.5 Acquire basic project management skills, including estimation, planning, and tracking progress.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
DSE	05CA623-A	SOFTWARE ENGINEERING	4	0	2	1	7	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Scheme of Assessment:

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Theory

Board of Study	Cous e Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA + ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT +AT)		
DSE	05C A62 3-A	**SOFTWARE ENGINEERING**	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

S3-ITEC4Q.l Students should be familiar with various phases of the software development process, including requirements analysis, design, implementation, testing, deployment, and maintenance.

Approximate Hours

Item	AppX Hrs
Cl	13
LI	0
SW	2
SL	1
Total	16

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)

SO1.1 Understand the requirement of software engineering. **SO1.2** Understanding standard for software process. **SO1.3** Understanding types of software development models. **SO1.4** Critically evaluate various types of software development models. **SO1.**5 Understand 4th generation models. .		**Unit-1.0 Introduction and Software Process Models (13 Lectures)** **1.1** Software, Software Engineering **1.2** Myths, Software Process **1.3** Work Products **1.4** Importance of Software Engineering **1.5** Standard for Software Process **1.6** Waterfall Model **1.7** Prototyping Model **1.8** Iterative Enhancement Model **1.9** Spiral Model **1.10** RAD model **1.11** 4th Generation models **1.12** Formal Methods **1.13** Agile development Model.	3. Learning about various SDLC models.

SW-1 Suggested Sessional Work (SW):

c. Assignments:

i. Critically evaluate spiral model.

ii. Explain agile development model.

d. Mini Project:

Compare various software development models.

e. Other Activities (Specify):

Find out the characteristics of a good software.

05CA623-A.2 Learn how to design software systems, considering factors such as modularity, scalability, and maintainability. Understand architectural patterns and their applications.

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	2

SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO2.1 To Understand the need for software requirement specifications. **SO2.2** To learn about Requirement verification and validation. **SO2.3** To understand the role of management in software development. **SO2.4** To understand project estimation techniques. **SO2.5** To learn about software configuration management.		**Unit-2.0 Requirement Engineering and Software Project Management (12 Lectures)** 2.1 Software Requirements, Types of Requirements 2.2 Requirement Engineering Cycle. 2.3 Requirements Specification document 2.4Characteristics of Requirements 2.5 Requirement verification and validation 2.6 Role of Management in Software Development 2.7 Project Estimation Techniques 2.8 Staffing & Scheduling 2.9 Earned Value Analysis 2.10 Software Risks 2.11 Software Configuration Management 2.12 Software Process and Project metrics.	1. Try to Implement project estimation techniques with an example.

SW-2 Suggested Sessional Work (SW):

Assignments:

Prepare a format of software requirement specification.
Explain software process and project matrix.

Mini Project:

Estimate a project using COCOMO model.

05CA623-A.3 Develop strong programming skills in relevant languages and frameworks. This Includes understanding data structures, algorithms, and design patterns.

Approximate Hours

Item	AppX Hrs
Cl	10
LI	0
SW	2
SL	2
Total	14

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self Learning (SL)**
SO3.1 Learning about software design concept. **SO3.2** Understand modular approach of designing. **SO3.3** Differentiate between coupling and cohesion. **SO3.4** Understand object-oriented approach of designing. **SO3.**5 Use coding style and documentation.		**Unit-3 Software Design and Coding** 3.1 Process, Data and Behavioural Modelling Essential Tags 3.2 Design Concepts 3.3 Modularity 3.4 Architectural design 3.5 Coupling and Cohesion 3.6 Top-down and bottom-up design 3.7 Object-oriented Analysis 3.8 Function- oriented and Object-Oriented Design approach 3.9 Software Design Document 3.10 Coding styles and documentation	1. Learning various approaches of software design.

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. Explain top-down and bottom-up approach of designing.

ii. Evaluate types of coupling.

b. Mini Project:

i. Create an DFD for any restaurant.

c. Other Activities (Specify):

i. Design and Develop UML diagrams for any Software Project.

05CA623-A.4 Understand the challenges and strategies associated with maintaining and evolving software systems over time. Understand the importance of quality assurance in software development.

Approximate Hours

Item	AppX Hrs
Cl	15
LI	0
SW	2
SL	2
Total	19

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)
SO4.1 Understanding different types of testing approach **SO4.2** Learn about different levels of testing. **SO4.3** Creating test cases for any algorithm. **SO4.4** Understanding the need for SQA. **SO4.5** Understand software quality factors.		**Unit-4.0 :Testing and Software Quality (15 Lectures)** 4.1 Testing principles & testing strategies 4.2 Black-box and White-box Testing Techniques 4.3 Levels of testing -unit, integration, system, regression 4.4 Test Plan 4.5 Test Cases Specification 4.6 Software debugging 4.7 Software Maintenance 4.8 Software Quality Assurance (SQA) 4.9 SQA tasks 4.10 Software amplification and removal 4.11 Formal Technical Reviews 4.12 Software Quality Factors 4.13 ISO 9126, SEI CMM, CMMI	. Differentiate between black box and white box testing. . Learn about software quality assurance.

		4.14 Software Reliability 4.15 Software Availability	

SW-4 Suggested Sessional Work (SW):

c. Assignments:

i. Write down the types of software maintenance.
ii. Explain the working of SQA.

2. Mini Project:

i. Learn to use version control systems (e.g., Git) to manage source code changes collaboratively.

3. Other Activities (Specify):

Develop the ability to create clear and concise documentation for software projects, including technical specifications, user manuals, and system documentation.

05CA623-A.5 Acquire basic project management skills, including estimation, planning, and tracking progress.

Approximate Hours

Item	AppX Hrs
Cl	10
LI	0
SW	2
SL	1
Total	13

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self Learning (SL)**
SO5.1 Understand the scope of CASE tools. **SO5.2** Understand the need of CASE in SDLC. **SO5.3** Learn about web engineering. **SO5.4** Learn about reverse engineering **SO5.5** Understanding the challenges of software engineering.		**Unit-5: Computer Aided Software Engineering and Advanced Topics** **(10 Lectures)** 5.1 Computer Aided Software Engineering (CASE) and its Scope 5.2 CASE support in Software Life Cycle 5.3 Architecture of CASE Environment. 5.4 Upper CASE and Lower CASE. 5.5 Exposure to CASE Tools 5.6 Software Process	1. Learn CASE Tools.

		Improvement 5.7 Component Based Software Engineering 5.8 Web Engineering and Reverse Engineering 5.9 Software Engineering challenges of Big Data 5.10 Mobile Applications	

SW-5 Suggested Sessional Work (SW):

b. Assignments

Find out challenges in software engineering.

How would you try to overcome these challenges?

What is CASE TOOL? Which are the top three open source case tools in the market and their unique features?

c. Mini Project: Implement CASE tools in your project.

d. Other Activities (Specify):

Explain reverse engineering

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
05CA623-A.1 Students should be familiar with various phases of the software development process, including requirements analysis, Design, implementation, testing, deployment, and maintenance.	13	2	1	16
05CA623-A.2 Learn how to design software systems, considering factors such as modularity, scalability, and maintainability. Understand architectural patterns and their applications.	12	2	1	15
05CA623-A.3 Develop strong programming skills in relevant languages and frameworks. This includes understanding data structures, algorithms, and design patterns.	10	2	1	13
05CA623-A.4 Understand the challenges and strategies associated with maintaining and evolving software systems over time. Understand the importance of quality assurance in software development.	15	2	2	19

05CA623-A.5 Acquire basic project management skills, including estimation, planning, and tracking progress.	10	2	1	13
Total Hours	60	10	6	76

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
05CA623-A.1	Students should be familiar with various phases of the software development process, including requirements analysis, design, implementation, testing, Deployment, and maintenance.	02	01	01	04
05CA623-A.2	Learn how to design software systems, considering factors such as modularity, scalability, and maintainability. Understand Architectural patterns and their applications.	02	04	02	08
05CA623-A.3	Develop strong programming skills in relevant languages and frameworks. This Includes understanding data structures, algorithms, and design patterns.	03	05	04	12
05CA623-A.4	Understand the challenges and strategies associated with maintaining and evolving software systems over time. Understand The importance of quality assurance in software development.	02	08	05	15
05CA623-A.5	Acquire basic project management skills, including estimation, planning, and tracking Progress.	03	05	03	11
Total		**12**	**23**	**15**	**50**

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for software engineering will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

- **A.** Improved Lecture
- **B.** Tutorial
- **C.** Case Method
- **D.** Group Discussion
- **E.** Role Play
- **F.** Visit any software development company
- **G.** Demonstration
- **H.** ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook,Twitter, WhatsApp, Mobile, Online sources)
- **I.** Brainstorming

Suggested Learning Resources:

A. Books:

S. No.	Title	Author	Publisher	Edition & Year
1	Software Engineering- A Practitioners Approach	R.Pressman	McGraw Hill International edition	2004
2	Software Engineering	N.S. Gill	Khanna Publishing Co.	Delhi 2018
3	Software Engineering	Ian Sommerville	Addison-Wesley	2010
4	An Integrated Approach to Software Engineering	Pankaj Jalote	Narosa	2014
5	Fundamentals of Software Engineering	By Rajib Mall	PHI Learning Pvt. Ltd	2014

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CO, PO and PSO Mapping

Program: B.Sc (IT)
Course Code: 05CA623-A
Course Title: Software Engineering

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO1 Students should be familiar with various phases of the software development process, including requirements analysis, design, implementation, testing, deployment, and maintenance.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO2. Learn how to design software systems, considering factors such as modularity, scalability, and maintainability. Understand architectural patterns and their applications	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO3. Develop strong programming skills in relevant languages and frameworks. This includes understanding data structures, algorithms, and design patterns.	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3

CO4: Understand the challenges and strategies associated with maintaining and evolving software systems over time. Understand the importance of quality assurance in software development.	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**1**	**2**	**3**	**3**	**3**	**3**	**2**	**2**
CO.5: Acquire basic project management skills including estimation, planning, and tracking progress.	-	-	-	**1**	**1**	**3**	**3**	**3**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**3**	**3**

Course Curriculum Map:

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self learning (SL)
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO-1: Students should be familiar with various phases of the software development process, including requirements analysis, design, implementation, testing, deployment, and maintenance.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		Unit-1.0 Introduction and software process models 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8	As mentioned in page number
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: Learn how to design software systems, considering factors such as modularity, scalability, and maintainability. Understand architectural patterns and their applications.	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5		Unit-2 Requirement Engineering and Software Project Management 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8,2.9,2.10	
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3: Develop strong programming skills in relevant languages and frameworks. This includes understanding data structures, algorithms, and design patterns.	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5		Unit-3: Software Design and Coding 3.1, .2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,3.10	
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO4: Understand the challenges and strategies associated with maintaining and evolving software systems over time. Understand the importance of quality assurance in software development.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5		Unit-4:Testing and Software Quality 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11,4.12,4.13,4.14,4.15	
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO5: Acquire basic project management skills, including estimation, planning, and tracking progress.	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5		Unit-5: Computer Aided Software Engineering and Advanced Topics 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application & Information Technology

Curriculum of BSC (IT) (Bachelor of Science)

(Revised as on 01 August 2023

Semester-VI

Course Code: **05CA623-B**

Course Title: **Mobile Application Development**

Pre-requisite: Student should have basic knowledge of Computer fundamentals.

Rationale: The study of this subject will develop understanding of Android core concepts. Android is a platform that is best suited for mobile devices. All these concepts will help students to develop elementary internet applications using AND RO ID that solve real-world problems.

Course Outcome:

05CA623-B -1 Able to use an integrated development environment to write, compile, run, and test simple Object-oriented Android programs.

05CA623-B -2 Understand and apply the concepts of Inheritance and Interfaces.

05CA623-B -3 Learn and apply applet programming to create basic web pages.

05CA623-B -4 Understand the Android event handling model and apply it to create interactive web pages.

05CA623-B -5 Able to implement I/O operations and connect to database to solve real-world problems.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits(C)
			Cl	LI	SW	SL	Total Study Hours(CI+LI+SW+SL)	
DES	05CA623-B	**Mobile Application Development**	4	0	1	1	6	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project, etc.),
SL: Self Learning,
C: Credits.

Scheme of Assessment:

Theory

Board ofStudy	CouseCode	Course Title	Scheme of Assessment (Marks)							
			Progressi ve Assessme nt (PRA)						End Semester Assessme nt (ESA)	Tota l Mar ks (PR A+ ESA)
			Class/Home Assignment5 number 3 marks each(CA)	Class Test2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activityany one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT +A T)		
DES	05C A62 3-B	**Mobile application development**	1 5	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

05CA623-B.1 Able to use an integrated development environment to Mobile devices

Item	AppXHrs
Cl	8
LI	0
SW	2
SL	2
Total	12

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO1.1 Understand about language and programming paradigm **SO1.2** Learn about structure, compilation and execution of an Android program and role of DVM	.	**Module 1.1: Introduction** 1.1 Mobile devices 1.2 mobile application 1.3 mobile environment and limitation 1.4 what is Android version and its features 1.5 set various Android devices on the market 1.6 Android market application store 1.7 Android development environment 1.8 system requirements	1 Use of android 2 Feature of Android

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Create a program in Android to check the input no is prime or not.
ii. Create a program in Android to print a factorial of given no.

b. Mini Project:

i. Create a program in Android to grocery store.

05CA623-B.2 Understand and apply the concepts of Android architecture.

Approximate Hours

Item	AppXHrs
Cl	16
LI	0
SW	2
SL	2
Total	20

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO2.1 Understand about architecture. **SO2.2** About Linux kernel android runtime. **SO2.3** Learn about application framework		**Module 2: Android architecture** 2.1 Android software stack 2.2 the Linux kernel android runtime 2.3 Dalvik virtual Machine 2.4 android runtime 2.5 core libraries Dalvik VM 2.6 specific library 2.7 Java inter-operability 2.8 libraries Android application framework 2.9 creating a new Android project 2.10 defining the project name 2.11 setting project configuration 2.12 setting configuration the launcher 2.13 creating an activity 2.14 running the application 2.15 application modifying 2.16 the example application review the layout and resource files	1 Study architecture 2 Study Linux kernel android runtime

SW-1 Suggested Sessional Work (SW):

a. Assignments:
   i. Discuss the concept of Java interoperability in the context of Android development
   ii. Describe the process of creating a new Android project.

b. Mini Project:

Create a program in Android to employee management.

05CA623-B.3 Learn and apply applet programming to create basic Android software development.

Approximate Hours

Item	AppXHrs
Cl	14
LI	1
SW	1
SL	2
Total	18

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO3.1 Learn about XML **SO3.2** Learn creating dalvik		**Module-3.0: Android software development** 3.1. leveraging Android XML.platform and framework 3.2. understanding Java SC and the dalvik virtual Machine 3.3. The directory structure of an Android project common default resource folder the holder of the value screen sizes launching the mobile application 3.4. the Android manifest.xml file Android application 3.5. component	1 Study software development 2 Create web screen

		Android activities defining the UI Android 3.6. services processing in the background broadcast receivers announcement and notification 3.7. content providers data management 3.8. Android intent objects messaging for components 3.9. Android manifest XML declaring Your components. 3.12. Interface components Label, Button, Check Box, and Radio Button. 3.13. Choice menu, Text area, Scroll list, Scroll bar 3.14. Frame, Layout managers-flow layout, Grid layout Border layout, Card layout	

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Create the home and Contact Us page for the University apps.

05CA623-B.4 Understand the Android event handling model and apply to create interactive web pages.

Approximate Hours

Item	AppX. Hrs.
Cl	12
LI	1
SW	1
SL	2
Total	16

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 Understand the basic concepts of Android user interface **SO4.2** Learn about view hierarchy **SO4.3** Learn about text	1. Learn how to create responsive layouts using techniques such as Relative Layout, Linear Layout, and Constraint Layout.	**Module-4.0 Android user interface** 4.1 views and layouts 4.2 designing for different 4.3 Android devices views and views group 4.4 Android Layout Manager the view hierarchy. 4.5 designing and Android 4.6 user interface using the graphical layout tool 4.7 displaying text with 4.8 text view 4.9 getting dates and times from users 4.10 using indicators to display data to users 4.11 adjusting progress 4.12 View to display images creating animation.	1. Study about Android user interface 2. Study about Android Layout interface

SW-1 Suggested Sessional Work (SW):

b. Assignments:

i. Implement event handling using Android.

ii. Give brief overview of TCP/IP and explain some of the events supported by Android.

05CA623-B.5 Able to implement I/O operations and connect to database to solve real world problems.

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Approximate Hours

Item	AppXHrs
Cl	10
LI	0

SW	2
SL	2
Total	14

Session Outcomes (SOs)	Laboratory Instruction (LI)	classroom Instruction (CI)	Self-Learning (SL)
SO5.1 Learn about SQLite. **SO5.2** Understand intense		**Module -5.0 Database intense saving and loading files** 5.1 SQLite data bases 5.2 Android database 5.3 design exposing 5.4 access to a data source to a content provider 5.5 content provider 5.6 registration native 5.7 content providers 5.8 intense and intense filter 5.9 intend overview implicit intense 5.10 creating the implicit intent example project explicit	1. Study about SQLite 2. Study about content providers

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Explain SQLite architecture.
ii. Mini Project:
iii. Create the salary page for the University apps.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour(Cl+SW+Sl)
05CA623-B.1 Able to use an integrated development environment to write, compile, run, and test simple object-oriented Android programs	8	2	2	12

05CA623-B.2 Understand and apply the concepts of architecture of Android and its applications	16	2	2	20
05CA623-B.3 Learn and apply android software development platform and framework	14	2	2	18
05CA623-B.4 Understand the Android user interface views and layout	12	2	2	16
05CA623-B.5 Able to implement database intense	10	2	2	14
Total Hours	60	10	10	80

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Able to use an integrated development environment to write, compile, run, and test simple object-oriented Android programs	03	04	03	10
CO-2	Understand and apply the concepts of architecture of Android and its applications	05	03	02	10
CO-3	Learn and apply android software development platform and framework	05	03	02	10
CO-4	Understand the Android user interface views and layout	04	05	01	10
CO-5	Able to implement database intense	03	05	2	10
	Total	20	17	13	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Visit any software development company

7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/TutorialsCBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

A. Books:

S. No.	Title	Author	Publisher	Edition & Year
1	MOBILE APPLICATIONS DEVELOPMENT	n.p.	Book Rivers	2021
2	Professional Mobile Application Development	McWherter, J., Gowell, S.	. Germany: Wiley.	2012

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15. Dr. Pinki Sharma, Assistant Professor, Department of Computer Science and Engineering.
16. Ms. Pushpa Kushwaha, Assistant Professor, Department of Computer Science and Engineering.

COs, POs and PSOs Mapping

Program: B.Sc.(IT)
Course Code: 05CA623-B
Course Title: Mobile Application Development

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO-1 Able to use an integrated development environment to write, compile, run, and test simple object-oriented Android programs.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO-2 Understand and apply the concepts of Inheritance and Interfaces.	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3
CO-3 Learn and apply applet programming to create basic web pages.	2	2	1	1	1	2	2	2	1	2	1	2	1	1	2	2	2
CO-4 Understand the Android event handling model and apply to create interactive web pages.	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2	2
CO-5 Able to implement I/O operations and connect to database to solve real world problems.	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO-1 Able to use an integrated development environment to write, compile, run, and test simple object-oriented Android programs.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5		**Unit-I Introduction** 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8	As mentioned in page number _ to _
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO-2 Understand and apply the concepts of Inheritance and Interfaces	SO2.1 SO2.2 SO2.3 SO2.4		**Unit-2 Android architecture** 2.1, 2.2, 2.3, 2.4, 2.5,2.6,2.7,2.8 2.9,2.10,2.11,2.12,2.13,2.14,2.15, 2.16	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO-3 Learn and apply applet Programming to create basic web pages.	SO3.1 SO3.2 SO3.3 SO3.4		**Unit-3 Android software development** 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8 ,3.9,3.10,3.11,3.12,3.13,3.14	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO-4 Understand the Android event handling model and Apply to create interactive web pages.	SO4.1 SO4.2 SO4.3		**Unit-4: Android user interface** 4.1,4.2,4.3,4.4,4.5,4.6,4.7, 4.8, 4.9, 4.10, 4.11, 4.12	
PO:1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO-5 Able to implement I/O operations and connect to database to solve real world Problems.	SO5.1 SO5.2 SO5.3		**Unit 5- Database intense saving and loading files** 5.1,5.2,5.3,5.4,5.5,5.6,5.6,5. 7,5.8,5.9, 5.10	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application & Information Technology

Curriculum of BSC (IT) (Bachelor of Science)

(Revised as on 01 August 2023)

Semester-VI

Course Code: **05CA621-A**

Course Title: AI and Data science

Pre-requisite: Basic knowledge of Data Structures, Data Management and Matrices.

Rationale: The purpose of this course is to provide an introduction to Artificial Intelligence (AI) and its application in solving real-world problems that are hard to articulate using traditional algorithmic approaches. The course covers the fundamental concepts behind different methodologies for creating intelligent systems that can deal with uncertainty, learn from experience, and apply problem-solving strategies inspired by nature.

Course Outcomes:

05CA621-A.1: Demonstrate knowledge of the fundamental principles of Artificial Intelligence.
05CA621-A.2: Apply different searching techniques.
05CA621-A.3: Demonstrate knowledge of Data Science.
05CA621-A.4: Familiarize knowledge representation in Data science.
05CA621-A 5: Comprehend the use of Python

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL+T)	
DSE	05CA621-A	AI and Data Science	4	0	2	2	8	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) And Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teachers to ensure the outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment	Class Test 2 (2 best out of 3)	Seminar one (SA)	Class Activity	Class Attendance (AT)	Total Marks (CA+CT+S		
DSE	05CA621-A	AI and Data science	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

05CA621-A.1: Demonstrate knowledge of the fundamental principles of Artificial Intelligence.

Approximate Hours

Item	Appx. Hrs.
Cl	10
LI	0
SW	2
SL	2
Total	14

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO1.1. Understand the concept of Artificial Intelligence **SO1.2.** Compare types of Intelligent agents. **SO1.3.** Apply types of intelligent agent's real life. **SO1.4.** Understand AI approaches **SO1.5** Recall applications of AI		**Unit-1: Introduction to AI** 1.1 Definitions, Goals of AI 1.2 AI Approaches 1.3 AI Techniques 1.4 Branches of AI, 1.5 Applications of AI. 1.6 Intelligent Agents: 1.7 Definition of a rational agent 1.8 reflex model based 1.9 utility-based agents 1.10 The environment in which particular agent operates	1. Search devices using artificial intelligence 2. Search devices using intelligent agents.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

1. Explain AI approaches.
2. Discuss different agents in AI.
3. Write AI techniques.

b. Other Activities (Specify):

Seminar and Tutorial

05CA621-A.2: Apply different searching techniques.

Approximate Hours

Item	Appx. Hrs.
Cl	14
LI	0
SW	2
SL	2
Total	18

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO2.1. Understand the concept of problem Solving. **SO2.2.** Use the Horn's logic in problems **SO2.3.** Recall Heuristic search techniques **SO2.4.** Apply Rules: Knowledge representation, predicate logic **SO2.5**. Discuss Unification algorithm	**LI01:** Write a program To implement A* algorithm **LI02:** Write a program to implement DFS search algorithm. **LI03:**Write a program to implement Mini – Max algorithm for Game playing **LI04:**Write a program to implement Unification algorithm	**Unit-2 Problem-solving** 2.1 Problem-Solving, Search, and Control Strategies 2.2 Search and control strategies, Exhaustive searches 2.3 Heuristic search techniques 2.4 Constraint satisfaction problems (CSPs) 2.5 Models 2.6 Knowledge Representation, Predicate Logic 2.7 Rules: Knowledge representation, KR using predicate logic 2.8 KR using rules, Resolution 2.9 Unification Algorithm 2.10 First-order predicate Calculus 2.11 Skolemization, Horn's Calculus 2.12 Semantic network 2.13 Frame system and value inheritance 2.14 Scripts and Conceptual Dependency.	1. How Predicate logic is used to solve real life problems. 2. Numerical based on Predicate Logic.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Explain Heuristic search techniques.
2. Discuss First-order predicate Calculus.
3. Unification algorithm.

b. Other Activities(Specify):

Seminar and Tutorial

05CA621-A.3: Demonstrate knowledge of Data Science.

Approximate Hours

Item	Appx. Hrs.
Cl	5
LI	0
SW	2
SL	2
Total	19

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO3.1. Understand the Concept of Data Science. **SO3.2.** Use of various data science toolkits. **SO3.3.** Apply various classification data **SO3.4.** Recall different types of data **SO3.5.** Explain Semi-structured and unstructured	**LI01:**Write a program to implement Mini – Max algorithm for Game playing **LI02:** Write a program to find the data distributions using a box and scatter plot. **LI03:** Write a program Plot the histogram, bar chart, and pie chart on the sample data	**Unit-3 : Introduction to data Science** 3.1 Definition, Data science in various fields, 3.2 Impact of Data Science, 3.3 Data Science tool kit 3.4 Understanding of Data 3.5 Types of data: 3.6 Numeric, Categorical 3.7 Graphical and multidimensional data 3.8 Classification of digital data: Structured 3.9 Semi-structured, 3.10 Unstructured 3.11 Sources of Data: Time Series, 3.12 Transactional data 3.13 Biological data, Spatial data 3.14 Social network data, 3.15 Data analytics life	1. Compare and analyze all data types. 2. Study different types of Data

		cycle	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Discuss different libraries in Data Science.
2. Explain different types of Data.
3. Discuss the classification of digital data.

b. Other Activities(Specify):

Seminar and Tutorial

05CA621-A.4: Familiarize knowledge representation in Data science.

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	0
SW	2
SL	2
Total	16

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1. Understand the Concept of data collection strategies. **SO4.2.** Explain Data Discretization **SO4.3.** Use of classification and prediction. **SO4.4.** Recognize features of data **SO4.5.** Apply logistic regression, decision tree algorithms in real-world problem	**LI01:**Write a program to implement a Random forest classification algorithm **LI02:** Write a program to understand Linear Regression. **LI03:** Write a program to implement Logistic Regression. **LI04:** Write a	**Unit-4 : Data collection strategies** 4.1 Data pre-processing overview, 4.2 Data cleaning 4.3 Data integration and transformation, 4.4 Data reduction, Feature selection 4.5 Dimensionality reduction 4.6 Data Discretization 4.7 Basic concepts of classification and prediction	1. Study different types of data preprocessing 2.Study different models based on classification algorithms

	program to preprocess data	4.8 General approach to solving a classification problem 4.9 Logistic regression, Decision tree 4.10 Random forest, Bayesian classification 4.11 Evaluating the accuracy of the classifier/predict 4.12 Model selection	

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Discuss the importance of Feature selection in data analytics.
2. Explain the Decision tree algorithm.
3. How to calculate the accuracy in classifier.

b. Other Activities(Specify):

Seminar and Tutorial

05CA621-A.5: **Comprehend the use of Python.**

Approximate Hours

Item	Appx. Hrs.
Cl	9
LI	0
SW	2
SL	2
Total	13

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Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO5.1. Recall Basics of Python **SO5.2.** Differentiate Tuples, Dictionaries **SO5.3.** Explain loop concepts **SO5.4.** Describe data Preprocessing. **SO5.5.** Develop codes in Python	**LI01:** Write a program to understand operators and data types **LI02:** Write an R program to get the first 10 Fibonacci numbers using for-loop **LI03:** Write a program to understand list data structure	**Unit 5** : **Introduction to Python language** 5.1 Data Types and Variables 5.2 Basic input-output operations 5.3 Operators, 5.4 Conditional execution 5.5 loops 5.6 List and list processing 5.7 Dictionaries, Tuples, Strings, Functions 5.8 Data Processing, Reading and writing data in various formats 5.9 Python libraries for data science	1. Study different formats of Data 2. Study different library functions

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Discuss various operations on Data.
2. Explain the list concept and operation son List.
3. Use different libraries and perform operations on Data.

b. Other Activities(Specify):

Seminar and Tutorial

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Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
CO1	10	2	2	14
CO2	14	2	2	18
CO3	15	2	2	13
CO4	12	2	2	16
CO5	09	2	2	13
Total Hours	60	10	10	80

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO1	Demonstrate knowledge of the Fundamental principles of Artificial Intelligence.	05	02	02	09
CO2	Apply different searching techniques.	02	03	05	10
CO3	Demonstrate knowledge of Data	02	03	06	11
	Science.				
CO4	Familiarize knowledge representation in Data science.	2	03	05	10
CO5	Comprehend the use of Python	-	05	05	10
Total		11	16	23	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Problem Solving and Programming will be held with written examination of 50 marks.

Suggested Learning Resources:

b. Books:

S. No.	Title	Author	Publisher	Edition &Year

1	Artificial Intelligence: Structures and strategies for Complex Problem Solving	Luger G.F. and Stubblefield W.A.	Addison Wesley	6th edition 2008
2	Artificial Intelligence: A Modern Approach	Russell S. and Norvig P	Prentice-Hall	3rd Edition 2009
3	Data Science and Machine Learning using Python	Dr Reema Thareja	McGraw Hill	August 2022

Curriculum Development Team

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COs, POs and PSOs Mapping

Program: BSC (IT)
Course Code: 05CA621-A
Course Title: AI and Data Science:

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer- based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO1: Demonstrate knowledge of the fundamental principles of Artificial Intelligence.	2	2	3	3	2	1	1	1	1	1	1	3	**2**	**3**	**1**	**2**	**2**
CO2: Apply different searching techniques.	2	3	2	3	2	2	1	1	1	1	1	3	**2**	**2**	**2**	**2**	**2**
CO3: Demonstrate knowledge of Data Science.	2	2	2	3	2	2	1	1	1	1	1	3	**1**	**1**	**2**	**2**	**2**
CO4: Familiarize knowledge representation in Data Science.	2	2	3	2	2	2	1	1	1	1	1	3	**2**	**3**	**1**	**2**	**2**
CO5: Comprehend the use of Python	2	2	3	2	2	2	1	1	1	1	1	3	**2**	**3**	**1**	**1**	**2**

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO1: Demonstrate knowledge of the fundamental principles of Artificial Intelligence.	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	Unit-1 : Introduction to AI 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO2: Apply different searching techniques.	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5	Unit-2 : Problem-solving 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9,2.10,2.11,2.12,2.13,2.14	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO3: Demonstrate knowledge of Data Science.	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5	Unit-3 **:** Introduction to data Science 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO4: Familiarize knowledge representation in Data science.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5	Unit-4: Data collection Strategies 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO5: Comprehend the use of Python	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5	Unit-5 : Introduction to python langu 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8	

Semester-VI

Course Code: **05CA622-A**

Course Title: Computer Graphics

Pre- requisite: Basics of Multimedia and Mathematics.

Rationale: The aim of the course is to introduce to the field of Computer Graphics with emphasis on its use to solve real world problems for which solutions are difficult to express using the traditional algorithmic approach. It explores the essential theory behind methodologies for developing systems that demonstrate graphical behavior.

Course Outcomes:

05CA622-A.1: Demonstrate knowledge of the fundamental principles of Computer graphics.
05CA622-A .2: Apply scan Conversion algorithms.
05CA622-A.3: Use various filled area primitives.
05CA622-A.4: Familiarize knowledge of clipping.
05CA622-A.5: Comprehend the use of animation.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits(C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
DSE	05CA622-A	Computer Graphics	4	0	1	1	6	4

Legend: CI: Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Course	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ESA)
			Class/Home Assignment 5 (2 best out number	Class Test 2 of 3)	Seminar one	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
DSE	05CA622-A	Computer Graphics	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

05CA622-A.1: Demonstrate knowledge of the fundamental principles of Computer Graphics.

Approximate Hours

Item	AppX Hrs
Cl	15
LI	0
SW	2
SL	1
Total	18

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)

SO1.1 Understand the Concept of Computer graphics. **SO1.2** Compare types of display devices. **SO1.3 Compare** types of output device.		1.1. Unit-1.Introduction of Computer graphics 1.2. Introduction to Computer Graphics: 1.3. Application of Computer Graphics, 1.4. Interactive and Passive Graphics. 1.5. Graphic Systems: 1.6. Display Processor, Cathode Ray Tube (CRT), 1.7. Random Scan vs Raster Scan 1.8. Color CRT Monitors, 1.9. Direct View Storage Tubes, 1.10. Flat Panel 1.11. Display. Input- Output Devices: 1.12. Input Devices, Trackball, Light Pen 1.13. Image Scanner, 1.14. Output Devices, 1.15. Plotters.	1.16. S earch all display devices 1.17. 1.18. N umerical based on display device.

SW-1 Suggested Sessional Work (SW):

Assignments:

iv. Numerical based on display devices.
v. Collect all the information of LED
vi. Questions related to display devices.

05CA622-A.2: Apply scan Conversion algorithms.

Approximate Hours

Item	AppX Hrs
Cl	14

LI	0
SW	2
SL	1
Total	17

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO2.1 Understand the Concept of scan conversion. **SO2.2** Use the DDA algorithm in problems **SO2.3** Demonstrate the use of Brenham's Algorithm.		**Unit-2.0** Scan Conversion a line 2.1. Scan Conversion Definition, 2.2. Scan Converting a Point, 2.3. Scan Converting a Straight Line, 2.4. DDA Algorithm. 2.5. Conversion Circle: Defining a Circle, 2.6. Defining a Circle using Polynomial Method, 2.7. Defining a Circle using Polar Coordinates Method 2.8. , Brenham's Circle Algorithm 2.9. , Midpoint Circle Algorithm. Scan	1. Numericals on DDA algorithm. 2. Numerical based on Bresenham,s algorithm
		2.10. Converting Ellipse: 2.11. Scan converting a Ellipse, 2.12. Polynomial, Method, 2.13. Trigonometric Method, 2.14. Midpoint Ellipse Algorithm	

SW-1 Suggested Sessional Work (SW):

Assignments:

I. Numerical based on Line.
II.Numerical based on circle.
III.Numerical based on Elipse.

05CA622-A.3: Use various filled area primitives.

Approximate Hours

Item	AppX Hrs
Cl	13
LI	0
SW	2
SL	1
Total	16

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**
SO3.1 Understand the Concept of polygon filling. **SO3.2** Use various filling algorithm. **SO3.3** Apply various Polygon algorithm.	LI3.1 Write a program on boundary fill algorithm. LI3.2 Write a program on Translation.	**Unit-3.0** Filled Area Primitives 3.1. : Boundary Fill Algorithm, 3.2. Flood Fill Algorithm 3.3. Scan Line Polygon Fill Algorithm. 3.4. 2D Transformations: Introduction of Transformation, 3.5. Translation, Scaling, 3.6. Rotation, 3.7. Reflection, Shearing, 3.8. Matrix Representation, 3.9. Homogeneous	1. Compare and analyze all area fill algorithm.
		Coordinates, Composite Transformation, 3.10. Pivot Point Rotation. 3.11. 2D- Viewing 3.12. Window, Window to Viewport Co-ordinate Transformation, 3.13. Zooming,	

SW-1 Suggested Sessional Work (SW):

Assignments:

1. Numerical based on transformation.

2. Numerical based on composite transformation.
3. Numerical based on window, viewport.

05CA622-A.4: Familiarize knowledge of clipping.

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self-Learning (SL)**
SO4.1 Understand the Concept of clipping. **SO4.2** Use of different Clipping algorithms. **SO4.3** Apply different Shading techniques**.**		**Unit-4.0** Clipping Techniques 4.1. Clipping, Point Clipping, 4.2. Line Clipping, 4.3. Midpoint Subdivision Algorithm, 4.4. Text Clipping, Polygon, 4.5. Sutherland Hodgeman 4.4. Polygon Clipping, 4.5. Weiler-Atherton Polygon 4.6. Clipping. Pointing & Positioning: 4.7. Pointing & Positioning Techniques 4.8. Elastic or Rubber Band Techniques, 4.9. Dragging. Shading 4.10. Introduction of Shading, 4.11. Constant Intensity Shading, 4.12. Gouraud shading, Phong Shading.	1. Compare and analyze all clipping algorithm.

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Questions based on clipping.
ii. Numerical based on clipping.
iii. Questions based on Shading.

05CA622-A.5: Comprehend the use of animation.

Approximate Hours

Item	AppX Hrs
Cl	6
LI	0
SW	2
SL	1
Total	9

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self-Learning (SL)
SO5.1 Understand the Concept of Animation. **SO5.2** Demonstrate the use of Animation.	.	**Unit-5.0 Animation.** 5.1. Animation, Application Areas of Animation, 5.2. Animation Functions 5.3. 3D Computer Graphics: Three-Dimensional Graphics, 5.4. Three Dimensional Transformations, Scaling, Rotation, Rotation about, Arbitrary Axis, Inverse Transformations, Reflection, 5.5. Shearing, Hidden Surfaces: Hidden Surface Removal, Back Face Removal Algorithm, Z-Buffer Algorithm 5.6. Shearing, Hidden Surfaces: Hidden Surface Removal, Back Face Removal Algorithm, Z-Buffer Algorithm	1. Compare and analyze all Hidden Removal techniques.

SW-1 Suggested Sessional Work (SW):

Assignments:

i. Different types of hidden removal techniques.
ii. Use of Painter's algorithm.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
05CA622-A.1: Demonstrate knowledge of the fundamental principles of Computer graphics.	15	02	01	18
05CA622-A.2: Apply scan conversion algorithms**.**	14	02	01	17
05CA622-A.3: Use various filled area primitives.	13	02	01	15
05CA622-A.4: Familiarize knowledge of clipping.	12	02	01	15
05CA622-A -5: Comprehend the use of animation.	6	02	01	09
Total Hours	60	10	5	75

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Introduction to Computer Graphics:	03	02	03	08
CO-2	Scan Conversion	03	01	05	09
CO-3	Filled Area Primitives:	03	07	02	12
CO-4	Clipping Techniques.	03	05	05	13
CO-5	animation	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

Suggested Instructional/Implementation Strategies:

2. Improved Lecture
3. Tutorial
4. Case Method
5. Group Discussion
6. Role Play
7. Visit to IT Industry
8. Demonstration
9. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT,Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
10. Brainstorming

Suggested Learning Resources:

Books:

S. No.	Title	Author	Publisher	Edition & Year
1	Computer Graphics C Version	Hearn	Pearson Education India;	2nd edition, 2002.
2	Computer Graphics: Principles and Practice	John Hughes, Andries van Dam, Morgan McGuire, David Sklar, James Foley	Addison-Wesley Professional	3rd Edition 2013
3	Lecture note provided by Dept. of CS&E, AKS University, Satna.			

A. Alternative NPTEL/SWAYAM/MOOC Course (if any):

S. No.	NPTEL Course Name	Instructor	Host Institute
1.	Computer graphics	Prof. Samit Bhattacharya	IIT Guwhati

Curriculum Development Team

1. Dr. Akhilesh A. Waoo, HOD, Department of Computer Science and Engineering.
2. Dr. Pramod Singh, Assistant Professor, Department of Computer Science and Engineering.
3. Ms. Shruti Gupta, Assistant Professor, Department of Computer Science and Engineering.
4. Ms. Pragya Shrivastava, Assistant Professor, Department of Computer Science and Engineering.
5. Mr. Lokendra Gaur, Assistant Professor, Department of Computer Science and Engineering.
6. Mr. Vinay Kumar Dwivedi, Assistant Professor, Department of Computer Science and Engineering.
7. Dr. Pinki Sharma, Assistant Professor, Department of Computer Science and Engineering.
8. Ms. Pushpa Kushwaha, Assistant Professor, Department of Computer Science and Engineerin

COs, POs and PSOs Mapping

Program: B.Sc.(IT)
Course Code: 05CA622-A
Course Title: Computer Graphics

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1 Demonstrate knowledge of the fundamental principles of Computer graphics.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO 2 : Apply scan conversion algorithms	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3
CO 3: : Use various filled area primitives.	2	2	1	1	1	2	2	2	1	2	1	2	1	1	2	2	2
CO 4: : Familiarize knowledge of clipping	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2	2
CO 5: Comprehend the use of animation..	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: Demonstrate knowledge of the fundamental principles of Computer graphics.	SO1.1 SO1.2 SO1.3		Unit-1 Introduction to Computer Graphics 1.1,1.2,1.3,1.4,1.5,1.6,1.7	As mentioned inpage number
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2 : Apply scan conversion Algorithms.	SO2.1 SO2.2 SO2.3		Unit-2 Scan Conversion 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 3: Use various filled area primitives.	SO3.1 SO3.2 SO3.3		Unit-3 Filled Area Primitives: 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 4: Familiarize knowledge ofclipping.	SO4.1 SO4.2 SO4.3		Unit-4 Clipping Techniques. 4.1,4.2,4.3,4.4,4.5,4.6,4.7	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 5: Comprehend the use of Animation..	SO5.1 SO5.2		Unit-5 Animation 5.1,5.2,5.3,5.4,5.5,5.6,5.7	

A K S University

Faculty of Engineering and Technology

Department of Computer Science & Engineering

Curriculum of B.Tech. (Computer Science & Engineering) **Program**

(Revised as on 01 August 2023)

Semester-VI

Course Code: 06CA652

Course Title: Field Project/Internship/Seminar/Workshop

Pre- requisite: Student should have knowledge of programming languages, Software Engineering, and Many more tools and framework.

Rationale:

- To apply the knowledge and skills learnt in previous semesters, to solve real life industrial / engineering / professional problems.
- To modify/ improve the existing engineering / professional systems.
- To develop systems / components / methods / processes / resources to cater the needs of the nearby small scale / medium industry.
- To learn to solve real life engineering / professional problems which often have many aspects to be considered and addressed.

Course Outcomes:

06CA652.1: - The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.
06CA652.2: - The student will be able to implement the project plan and manage the project.
06CA652.3: - The student will be able to present the completed project work.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Project	06CA652	Field Project/Internship/Seminar/Workshop	0	4	0	0	4	2

The Course on Project Work consists of five phases: -

	Description of phases	Learn Hrs.
1	Literature / industry's need survey and finalization of topic / title	15 Hrs
2	Detailed planning of the project work	
3	Implementing the detailed project plan	60 Hrs
4	Managing the project activities	
5	Reporting of the project work output/outcome / prototype	15 Hrs
	Total	90 Hrs

General Guidelines for Project Work

- The project topics should be related to concerned branch of engineering / profession, but should not be the exact content of the curriculum taughtin the discipline.
- Student's project topics should be preferably 'real life' topics. It means the project topics should have substantial element of uncertainty, complexity and multi-disciplinary-ness which can be coped up by the students. These elements offer opportunities to students to apply engineering/ professional knowledge in real life settings, solve real life problems and to take real life decisions. As a project guide, concerned teacher should ensure these by suitably altering / framing / reframing the statement of topic / title.
- The project topics should be such that students can get opportunity to refer IS codes, Manuals, Handbooks, norms and standards, opportunity to conduct standard tests, and opportunity to operate modern laboratory equipment's following SOPs.
- For student's interest, active participation and ownership in the project work, their self-motivation is necessary. Therefore, students should be actively involved in finalizing the topic of project.
- Students should be asked to conduct a brief review of literature for problems and issues in their engineering / professional areas of interest, where they think they can contribute effectively. The project guide should facilitate them in this regard, through his/her expertise and experience.
- Every student group should be asked to propose at least three topics oftheir interest. The topics proposed by student project groups should be assessed bythe facilitator-teacher on following three criteria: -
    - **The work on the topic should be theoretically and practically feasible.**
    - **The project work on the topic should be completed within approx. Three and half months.**
    - **Availability of required resources should be certain. Cost of project work should also be bearable.**
- Normally, students' project works should be carried out in small groups (1 to 2 students).
- All faculty members of department should be engaged as project guides. Every faculty member should be project guide of at least one student project group.
- Normally, project guides should be assigned to the students through lottery system and students under each faculty should be asked to formtheir small groups.

COs, POs and PSOs Mapping

Course Title: BSc IT
Course Code: 06CA652
Course Title: Field Project/Internship/Seminar/Workshop

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1: The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.	2	3	3	2	3	2	3	1	3	1	3	3	2	3	3	1	2
CO 2: The student will be able to implement the project plan and manage the project.	2	3	3	2	3	2	3	1	3	1	3	3	2	2	2	2	3
CO 3: The student will be able to present the completed project work.	2	2	3	1	3	2	2	1	3	1	3	3	2	3	2	2	2

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.	-	-	-	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: The student will be able to implement the project plan and manage the project.	-	-	-	
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 3: The student will be able to present the completed project work.	-	-	-	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application & Information Technology

BSc (Bachelor of Science [Information Technology])

(Revised as on 01 August 2023)

Semester-VII

Corse Code: 06RM701

Course Title : Research Methodology

Pre-requisite: Student should have basic knowledge of research and Statistics.

Rationale: This course will help them to select an appropriate research design. With the help of this course, students will be able to take up and implement a research project/ study. The course will also enable them to collect the data, edit it properly and analyze it accordingly.

Course Outcomes:

06RM701.1: Understand research problem formulation.

06RM701.2: Analyze research related information and Follow research ethics

06RM701.3: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.

06RM701.4: Understanding that when IPR would take such important place in growth of Individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering In particular.

06RM701.5: IPR protection incentivizes inventors to invest in R&D, leading to new and improved products, economic growth, and social benefits.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credit (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Research	06RM701	Research Methodology	4	0	2	1	6	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performance laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA + ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
Research	06RM701	Research Methodology	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

CO1: Understand research problem formulation.

Approximate Hours

Item	Appx Hrs
Cl	11
LI	0
SW	2
SL	1
Total	14

Session Outcomes(SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO1.1 Define a research problem **SO1.2** Explain Characteristics of a good research problem **SO1.3** Explain Scope and objectives of research problem **SO1.4** Discuss data collection **SO1.5** Explain analysis, interpretation .	.	**Unit-1 Introduction to Research** 1.1 Meaning of research problem, 1.2 Sources of research problem 1.3 Criteria Characteristics of a good research problem, 1.4 Errors in selecting a research problem 1.5 Scope of research problem. 1.6 objectives of research problem. 1.7 Approaches of investigation of solutions for research problem 1.8 data collection, 1.9 data analysis, 1.10 data interpretation, 1.11 Necessary instrumentations-1	1. Write a Process of research problem identification

SW-1 Suggested Sessional Work (SW):

a. Assignments:

(i) Discuss about Errors in selecting a research problem

b. Presentation

c. Pictorial representation of different components of computer

CO2: Analyze research related information and Follow research ethics

Approximate Hours

Item	Appx Hrs
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**

SO2.1 To Understand Effective literature studies. SO2.2 To learn different approaches. SO2.3 Explain Plagiarism. SO2.4 Explain research ethics.	.	**Unit-2 : Literature Review** 2.1 Literature review 2.2 How to write literature reviews 2.3 Effective literature studies 2.4 Approaches to literature studies 2.5 Analysis 2.6 References and bibliography 2.7 APA/MLA and other reference styles 2.8 Plagiarism, **2.9 Types of plagiarism** **2.10 Plagiarism tools** 2.11 Research ethics-1 2.12 Research ethics-2	1.Write a Review

SW-2 Suggested Seasonal Work (SW):

a. **Assignments:**
   (i) **Write the different approaches of analysis?**
b. **Presentation**
c. **Pictorial representation of different components of research design?**

CO3: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity

Approximate Hours

Item	Appx Hrs
Cl	11
LI	0
SW	2
SL	1
Total	14

Session Outcomes	Laboratory Instruction	Classroom Instruction	Self-Learning (SL)

(SOs)	(LI)	(CI)	
SO3. 1 To understand Effective technical writing, SO3.2 know the Format of research proposal SO3.3 Develop a Research Proposal SO3.4 know about presentation of research proposal SO3.5 To understand the assessment of research proposal.		**Unit-3: Research Proposal** **3.1 Research Proposal** **3.2 types** 3.3 Effective technical writing-1 3.4 Effective technical writing-2 3.5 How to write report, 3.6 How to write report, research Paper. 3.7 Developing a Research Proposal, 3.8 Format of research proposal 3.9 Write a research proposal 3.10 presentation 3.11 assessment by a review committee	**i. Design a research proposal**

SW-2 Suggested Seasonal Work (SW):

a. Assignments:
   (i) Explain writing a project proposal?
b. Presentation
c. Pictorial representation of different components of computer

CO4: Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.

Approximate Hours

Item	Appx Hrs
Cl	13
LI	0
SW	2
SL	1
Total	16

Session Out comes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO4.1 To Understand Nature of Intellectual Property **SO4.2** To understand Patents, Designs, Trade and Copyright **SO4.3** Explain the process of patenting **SO4.4** To understand the development of technological research **SO4.5** To Understand Procedure for grants of patents, Patenting under PCT.	.	**Unit-4 : Intellectual Property** 4.1 Nature of Intellectual Property. 4.2 Patents, 4.3 Designs, 4.4 Trade and 4.5 Copyright 4.6 Process of Patenting and 4.7 Development technological research 4.8 innovation, 4.9 patenting, 4.10 development. 4.11 International cooperation on Intellectual Property 4.12 Procedure for grants of patents, 4.13 Patenting under PC	i. Prepare a intellectual property proposal ii. Draw a classification diagram of RAID

SW-4 Suggested Seasonal Work (SW):

a. Assignments:
b. (i) Write the process of patent design
c. Presentation
d. Pictorial representation of different steps of patent design.

CO5: IPR protection incentivizes inventors to invest in R&D, leading to new and improved products, economic growth, and social benefits.

Approximate Hours

Item	Appx Hrs
Cl	13
LI	0
SW	2
SL	1
Total	16

Session Outcomes(SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO5.1 Explain Patent Rights **SO5.2** Discuss Licensing and transfer of technology **SO5.3**Discuss about Patent information and databases **SO5.4** Understand Geographical Indications **SO5.5** Explain new developments in IPR		**Unit5: IPR protection and Developments in IPR** 5.1 Patent Rights-1 5.2 Patent Rights-2 5.3 Scope of Patent Rights 5.4 Licensing and transfer of technology-1 5.5 information and databases-1 5.6 Geographical Indication 5.7 Administration of Patent System. 5.8 New developments in IPR; 5.9 IPR of Biological Systems, 5.10 IPR of Computer Software etc. 5.11 Traditional knowledge 5.12 Case Studies, 5.13 IPR and IITs	i. Learn about scope of patent rights ii. Learn about IPR

SW-5Suggested Seasonal Work (SW):

a. Assignments:
(i) Explain in detail about geographical indications.

b. Presentation:

c. Other Activities (Specify):
(i) Group discussion of important topics.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
CO1 Understand research problem formulation	11	2	1	14
CO2 Analyze research related information and Follow research ethics	11	2	1	14
CO3 Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.	12	2	1	15
CO4 Understanding that when IPR would take such important place in growth of Individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering In particular.	13	2	1	16
CO5 IPR protection incentivizes inventors to invest in R&D, leading to new and improved products, economic growth, and social benefits.	13	2	1	16
Total Hours	60	10	6	76

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Unit-1	03	02	03	08

CO-2	Unit-2	03	01	05	09
CO-3	Unit-3	03	07	02	12
CO-4	Unit-4	03	05	05	13
CO-5	Unit-5	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Research Methodology & IPR will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play
6. Data center
7. Demonstration
8. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
9. Brainstorming

Suggested Learning Resources:

A. Books:

S. No.	Title	Author	Publisher	Edition & Year
1	Research Methodology	C R Kothari ,Gaurav Garg	New Age International	2023
2	Research Methodology: Concepts And Cases	Deepak Chawla (Author), Neena Sondhi (Author)	Vikas Publishing House	May 2016

B. Alternative NPTEL/SWAYAM/MOOC Course (if any): NA

C. Curriculum Development Team

1. Dr. Akhilesh K. Waoo, HOD, Department of Computer Science and Engineering.
2. Dr. Pramod Singh, Associate Professor, Department of Computer Science and Engineering.
3. Ms. Shruti Gupta, Assistant Professor, Department of Computer Science and Engineering.
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7. Ms. Pinki Sharma, Assistant Professor, Department of Computer Science and Engineering.
8. Ms. Pushpa Kushwaha, Assistant Professor, Department of Computer Science and Engineering.

COs, POs and PSOs Mapping

Course Title: B.Sc. IT
Course Code: 06RM701
Course Title: Research Methodology and IPR

Course Outcomes	Program Outcomes												Program Specific Outcome			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning				
RC602.1 At the end of this chapter the student will Understand research problem formulation.	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1
RC602.2 At the end of this chapter the student will Analyze research related information and Follow research ethics	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1
RC602.3 At the end of this chapter the student will Understand that today's world	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2
RC602.4 At the end of this chapter the student will know about Intellectual Property Right	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3
RC602.5 at the end of this chapter the student will Understand that IPR protection	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	**CO1** At the end of this chapter the student will Understand research problem formulation.	SO1.1 SO1.2 SO1.3 SO1.4		Unit-1 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9,1.10,1.11	As mentioned above
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	**CO2** At the end of this chapter the student will Analyze research related information and Follow research ethics	SO2.1 SO2.2 SO2.3 SO2.4		Unit-2 2.1, 2.2, 2.3, 2.4, 2.5,2.6,2.7,2.8,2.9,2.10,2.11	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	**CO3** At the end of this chapter the student will Understand that today's world	SO3.1 SO3.2 SO3.3 SO3.4		Unit-3 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,3.10,3.11,3.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	**CO4** At the end of this chapter the student will know about Intellectual Property Right	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5		Unit-4 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11,4.12,4.13	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	**CO5** at the end of this chapter the student will Understand that IPR protection	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5		Unit-5 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10,5.11,5.12,5.13	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application & Information Technology

BSc (Bachelor of Science [Information Technology])

(Revised as on 01 August 2023)

Semester-VII

Course Code: **01CA711**

Course Title : Current trends and technology

Pre-requisite: Basic knowledge of HTML, CSS and JAVASCRIPT.

Rationale: Studying this subject will help students develop an understanding of current technologies such as Blockchains, ReactJS, NodeJS, Express, and MongoDB. By learning about these technologies, students will gain insights into how various industries are using them for their products and what the current demand is. As industries are seeking full-stack developers in this era of rapid technological advancement, this study will help students become industry-ready.

Course Outcomes:

01CA711.1: Understand Concepts of Blockchain, basic cryptocurrency, cryptocurrency benefits and Cryptographic use in cryptocurrency.

01CA711.2: Use of JAVAScript knowledge to learn different types of new Frameworks available in a market that are also current industry need.

01CA711.3: Develop client-server connectivity with the use of Node JS and use of Express frameworks.

01CA711.4: Develop algorithms for text processing applications and Dynamic programming Applications.

OEC-E01 - B.5: Design Web applications using MongoDB database with NodeJS Technology in Backend.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Major	01CA711	Current trends and technology	4	4	1	1	10	6

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),

LI: Laboratory Instruction (Includes Practical performances in laboratory workshop,field or other locations using different instructional strategies)

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SW: Sessional Work (includes assignment, seminar, mini project etc.),

SL: Self Learning,

C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback teachers ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+ CAT+AT)		
PCC	01CA711	Current trends and technology	15	20	5	5	5	50	50	100

Practical

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)						
			Progressive Assessment (PRA)					End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Viva1 (5)	Viva2 (5) (SA)	Class Attendance (AT)	Total Marks (CA+CT+SA+ CAT+AT)		
Major	01CA711	Current Trends and Technology	35	5	5	5	50	50	100

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Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

01CA711.1: Understand Concepts of Block chain, basic cryptocurrency, cryptocurrency benefits, and cryptographic use in cryptocurrency.

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
O1.1 Remember basics of Blockchain concepts. **SO1.2** Explain Bitcoin and understanding of smart contracts **SO1.3** Differentiate between public and private Blockchain. **SO1.4** Discuss cryptocurrency and the permission model of Blockchain. **SO1.5** Name Security Measures in Blockchain.	**LI01.** Create a simple block chain in JavaScript. Implement the data structure for blocks and the hashing function for blocks. **LI02.** Implement a basic cryptocurrency transaction in a block chain. Create a transaction class and include it in your blockchain. **LI03.** Implement a basic cryptocurrency transaction in a blockchain. Create a transaction class and include it in your blockchain. **LI04** Purchase a cryptocurrency.	**Unit-1.0 : Blockchain Technology** 1.1 Introduction to Block chain, Public Ledgers. 1.2 Bitcoin, Smart Contracts, Block in a Block chain 1.3 Transactions, Distributed Consensus, 1.4 Public vs Private Block chain. 1.5 Understanding Cryptocurrency to Block chain, 1.6 Permissioned	1. Difference between public and private Blockchain 2. Learning of different cryptographic models used in Blockchain

	LI05 Demonstrate Hash pointer. **LI06** Demonstrate Merkle Tree.	Model of Block chain 1.7 Overview of Security aspects of Block chain; Basic Crypto Primitives. 1.8 Cryptographic Hash Function, Properties of a hash function 1.9 Hash pointer and Merkle tree. 1.10 Digital Signature. 1.11 Public Key cryptography 1.12 Basic cryptocurrency	

SW-1 Suggested Sessional Work (SW):

a. Assignments:

1. Discuss Public ledgers.
2. Discuss basic cryptocurrency and its types.
3. Explain cryptographic hash function.

b. Other Activities (Specify):

Seminar and Tutorial

01CA711.2: Use of JAVAScript knowledge to learn different types of new Frameworks available in market that are also current industry need.

Approximate Hours

Item	Appx. Hrs.
Cl	13
LI	12
SW	1
SL	1
Total	27

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)

SO2.1 To Understand the basics of JavaScript and role of JavaScript in web world. **SO2.2** Recall data types and variables in JavaScript	**LI01**. Write a calculator program in JAVASCRIPT	**Unit-2: Introduction to JavaScript** 2.1. Basics of JavaScript 2.2. JavaScript Data Types and 2.3. Variables, constant 2.4. JavaScript Operators, 2.5. JavaScript statements conditional 2.6. Looping statements	1. Study of applications where JavaScript concepts are used 2.Study of different operators and loop statements
SO2.3 Understand and recall JavaScript operators and JavaScript conditional and loop statements **SO2.4** Use of functions in JavaScript. Learning of Arrow functions **SO2.5** Understanding of classes and objects in JavaScript	. **LI02.** Write a program using event in JavaScript. **LI03**. Write a program to implement dropdown in webpage using JAVASCRIPT **LI04** WAP demonstrate Java script functions. **LI05** WAP to demonstrate constructers in javascript. **LI06** WAP to demonstrate Event handling in javascript.	2.7. 2.4 JavaScript Functions 2.8. simple function and 2.9. arrow functions 2.10. classes, objects and 2.11. constructers in JavaScript 2.12. Document Object Model (DOM) 2.13. Event Handling in JavaScript	

SW-2 Suggested Sessional Work (SW):

a. Assignments:

1. Discuss JavaScript features and applications in Real world.
2. Explain Event handling in JavaScript.
3. Explain DOM.

b. Other Activities(Specify):

Seminar and Tutorial

01CA711B.3: Apply the knowledge of JAVASCRIPT in the ReactJS framework to create front end of dynamic webpages.

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Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO3.1. Recall the basics of ReactJS **SO3.2.** Differentiate DOM and Virtual DOM **SO3.3.** Illustrate rendering of element **SO3.4.** Explain class component and functional component **SO3.5.** Develop basic applications of React	**LI01**. Create a component called "Fruit List" that receives an array of fruit names as a prop and displays them as a list. **LI02.** Create a functional component called "Greeting" that takes a "name" prop and displays a personalized greeting. **LI03**. Refactor the "HelloWorld" component to use React Hooks for state management instead of a class component. **LI04** WAP to demonstrate Class in React JS **LI05** WAP to demonstrate functions in React JS **LI06** WAP to	**Unit-3 : ReactJS** 3.1 Introduction to react, features of React JS, Component based programming 3.2 3.2 Virtual DOM, JSX 3.3 Basic program in React JS 3.4 Rendering elements 3.5 Components: class components and 3.6 functional components 3.7 State management, 3.8 Lifecycle methods 3.9 Event handling in React 3.10 Conditional rendering 3.11 List and keys 3.12 Basic form handling in React	1. Practice Basic programs based on React concept 2. Study of list and keys

	demonstrate List in React JS		

SW-3 Suggested Sessional Work (SW):

a. Assignments:

1. Design a Web page to explain props and state management.
2. Explain list and keys.
3. Explain Form handling in React.

b. Other Activities(Specify):

Seminar and Tutorial

01CA711.4: Develop client-server connectivity with the use of Node JS and use of Express Frameworks.

Approximate Hours

Item	Appx. Hrs.
Cl	10
LI	12
SW	1
SL	1
Total	24

Session Outcomes(SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
Recall features of NodeJS and its applicatons **SO4.2** Explain importanceof MERN stack. **SO4.3** Create a web page where callbacks and errors handled. **SO4.4** Explore the conceptof Modules in NodeJs. **SO4.5** Use of Export andRequire in	**LI01**. Write a Node.js program that reads a user's name from the command line and greets them with "Hello, [Name]!" **LI02**. Create a simple Node.js server that listens on port 3000 and responds with "Hello, Server!" when accessed in a web browser. **LI03.** Write a Node.js program that reads and prints the contents of a text file named "sample.txt". **LI04** WAP to	**Unit-4:** NodeJS 4.1. Introduction of NodeJS 4.2. installation of NodeJS and 4.3. Features of NodeJS 4.4. Importance of MERN Stack 4.5. Node JS basics: 4.6. understanding the flow of request 4.7. Callbacks and 4.8. error Handling 4.9. Understanding Modules. 4.10. Export and Require Events in NodeJS Event emitter class	1. Study different event use in NodeJS 2. Study Event Emitter class and its functions

NodeJS.	demonstrate flow of request in NodeJS **LI05**. WAP to demonstrate error handling in NodeJS **LI06** WAP to demonstrate Event emitter class in NODE Js		

SW-4 Suggested Sessional Work (SW):

a. Assignments:

1. Discuss the advantages and features of NodeJS.
2. Discuss different Modules in NodeJs.
3. Discuss callbacks and error handling.

b. Other Activities (Specify):

Seminar and Tutorial

01CA711.5: Design Web applications using MongoDB database with NodeJSTechnology in Backend.

Approximate Hours

Item	Appx. Hrs.
Cl	13
LI	12
SW	1
SL	1
Total	27

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO5.1.Recall the basics of Express and its features **SO5.2** Role of sequencing response by routers **SO5.3** Create a Web application based on Rest API **SO5.4** Use of static files and	**LI01.**Installation and Setup of MongoDB and start the MongoDB server. **LI02.** How can you connect to a MongoDB database using the MongoDB shell? **LI03.** How do you create a new database in MongoDB?	**Unit 5: Express & MongoDB** 5.1. Basics of Express 5.2. Installation of MongoDB 5.3. Creating Routes and 5.4. Responding. 5.5. Sequencing response By routes. 5.6. A Rest API Example 5.7. 5.5 Static files and middleware 5.8. Mongo DB Introduction 5.9. Set up MangoDB,	1. Study different types of trees application. 2. Explore computationa l geometry methods

middleware. **SO5.5** Setup of MongoDB And its use in advance web development	**LI04** Setup MongoDB **LI05** WAP to demonstrate MongoDB queries. **LI06** WAP to demonstrate rest API	Install Mongo client 5.10.MongoDB queries 5.11.install mongoose for node JS 5.12.The rest API example to use database	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

1. Discuss the importance of Express.
2. Explain the different types of APIs used in Web development
3. Write steps to install MongoDB.

b. Other Activities (Specify):

Seminar and Tutorial

Brief of Hours Suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instruction (LI)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
OEC-E01 - B.1: Understand Blockchain concepts, basic cryptocurrency, cryptocurrency benefits and cryptographic use in cryptocurrency.	12	12	1	1	26
OEC-E01 - B.2: Use of JAVAScript knowledge to learn different types of new Frameworks available in market that are also current industry need.	13	12	1	1	27
OEC-E01 - B.3: Apply the knowledge of JAVASCRIPT in ReactJS framework to create front end of dynamic webpages.	12	12	1	1	26

OEC-E01 - B.4: Develop client server connectivity with the use of Node JS and use of Express frameworks.	10	12	1	1	24
OEC-E01 - B.5: Design Web applications using MongoDB database with NodeJS Technology in Backend.	12	12	1	1	27
Total Hours	60	60	5	5	130

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
OEC-E01 - B.1	Blockchain Technology	4	3	3	10
OEC-E01 - B.2	Introduction to JavaScript	3	4	3	10
OEC-E01 - B.3	ReactJS	3	3	4	10
OEC-E01 - B.4	NodeJS	2	3	5	10
OEC-E01 - B.5	Express & MongoDB	-	3	7	10
Total		12	16	22	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Current trends & Technology will be held with written examination of 50 marks.

Suggested Learning Resources:

a. Books:

S. No.	Title	Author	Publisher	Edition &Year

1	The Road to Learn React: Your journey to master plain yet pragmatic React.js	By Robin Wieruch.		Kindle edition & 2018
2	Learn MERN stack development by building modern web apps using MongoDB, Express, React, and Node.js,	by Shama Hoque		2nd Edition
3	Melanie Swan, "Block Chain: Blueprint for a New Economy".	O'Reilly	National Council for Cement and Building Materials	2015

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COs, POs and PSOs Mapping

Program: B.Sc. IT
Course Code: 01CA711
Course Title: Current Trends & Technology

Course Outcomes	Program Outcomes												Program Specific Outcome			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning				
OEC-E01 - B.1: Understand Concepts of Blockchain, basic cryptocurrency, cryptocurrency benefits and cryptographic use in cryptocurrency.	1	1	2	2	3	2	3	1	2	1	3	2	2	3	1	2
OEC-E01 - B.1.2: Use of JAVAScript knowledge to learn different types of new Frameworks available in market that are also current industry need	2	1	2	2	1	2	3	1	1	1	2	2	2	2	2	2
OEC-E01 - B.3: Apply the knowledge of JAVASCRIPT in ReactJS framework to create front end of dynamic webpages.	2	2	1	1	1	2	2	1	1	2	3	3	1	1	2	2
OEC-E01 - B.4: Develop client server connectivity with the use of Node JS and use of Express frameworks.	3	2	2	2	3	2	3	1	2	1	3	3	2	3	1	2
OEC-E01 - B.5: Design Web applications using MongoDB database with NodeJS Technology in Backend.	2	2	2	1	1	3	3	1	1	1	2	2	2	3	1	1

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	Laboratory Instruction(LI)	SOs No.	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO1: Understand Concepts of Blockchain, basic cryptocurrency, cryptocurrency benefits and cryptographic use in cryptocurrency.	LI01.1,LI01. 2,LI01.3	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	Unit-1 : Block chain Technology 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9,1.10,1.1 1,1.12	As mentioned above
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO2: Use of JAVA Script knowledge to learn different types of new Frameworks available in market that are also current industry need	LI02.1,LI02. 2,LI02.3	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5	Unit-2 : Introduction to JavaScript 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9,2.10,2.11,2.12,2.13	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO3: Apply the knowledge of JAVASCRIPT in ReactJS framework to create front end of dynamic webpages.	LI03.1,LI03 .2,LI31.3	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5	Unit-3 : ReactJS 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,3.10,3.11, 3.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO4: Develop client server connectivity with the use of Node JS and use of Express frameworks.	LI04.1,LI04. 2,LI04.3	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5	Unit-4: NodeJS 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.1 1,	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO5: Design Web applications using MongoDB database with NodeJS Technology in Backend.	LI05.1,LI05. 2,LI05.3	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5	Unit-5: Express & MongoDB 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10,5. 11,5.12	

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Semester-VII

Course Code: 05CA722-A

Course Title: Introduction to Cyber Security

Pre-requisite: In order to learn Cyber Security, students must be familiar with the basics of computer science. To understand how to protect information systems from attack, it is necessary to understand how systems work.

Rationale: The objective of this course is to introduce Cyber Security Application of Cyber Security, pattern matching and cluster analysis is included to aware students of broad Cyber Security areas.

Course Outcome:

05CA722-A.1: Recall the basics of Cyber Security
05CA722-A.2: Understand the cyber security threat landscape.
05CA722-A.3: Develop a deeper understanding and familiarity with various types of cyberattacks, Cyber-crimes.
05CA722-A.4: Analyse and evaluate existing legal framework and laws on cyber security.
05CA722-A.5: Analyse and evaluate the digital payment system security and remedial measures against Digital Payment frauds.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme ofstudies (Hours/Week)					Total Credits(C)
			Cl	LI	SW	SL	Total Study Hours(CI+LI+SW+SL)	
DSE	05CA722-A	Introduction to Cyber Security	4	0	2	2	8	4

Legend: CI: Classroom Instruction (Includes different instructional strategies i.e., Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.)
SL: Self Learning.
C: Credits.

Note: SW&SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignmen	Class Test 2 (2 best out of 3)	Seminar one	Class Activity	Class Attendance	Total		
DSE	05CA722-A	Introduction to Cyber Security	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

05CA722-A**.1: Recall the basics of Cyber Security**

Approximate Hours

Item	AppXHrs
Cl	12
LI	0
SW	2
SL	2
Total	16

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO1.1 Defining Cyberspace and Overview of Computer and Web-technology **SO1.2** Architecture of Cyberspace. **SO1.3** Communication and web technology, Internet, World wide web, **SO1.4** Advent of internet, Internet infrastructure for data transfer and governance **SO1.**5 Internet society, Regulation of cyberspace,		**Module-1.0 Introduction to Cyber security**: 1.1 Defining Cyberspace 1.2 Overview of Computer and Web-technology 1.3 Architecture of cyberspace. 1.4 Communication and web technology 1.5 Internet, 1.6 World wide web, 1.7 Advent of internet, 1.8 Internet infrastructure for data transfer and governance 1.9 Internet society, 1.10 Regulation of cyberspace, 1.11 Concept of cyber security 1.12 Issues and challenges of cyber security	1. Learn about Cyber Security.

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i. Issues and challenges of cyber security

ii. Concept of cyber security

b. Mini Project:

i. Explore common cyber threats such as malware, phishing, ransomware, and DDoS attacks.

c. Other Activities (Specify):

Provide examples and case studies.

05CA722-A**.2: Understand the cyber security threat landscape.**

Approximate Hours

Item	AppXHrs
Cl	12
LI	0
SW	2
SL	2
Total	16

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO2.1 Understand Classification of cyber-crimes, **SO2.2**LearnAbout Common cybercrimes-cybercrime targeting computers and mobiles **SO2.3**UnderstandAbout cyber crime against women and children, financial frauds, **SO2.4** Understand about social engineering attacks, malware and ransomware attacks, zero day and zero click attacks,	**SO2.5** Cybercriminals modus- operandi , Reporting of cybercrimes, Remedial and mitigation measures, **Module 2.0 Cybercrime and Cyber law** 2.1 Classification of cybercrimes, 2.2 Common cybercrimes 2.3 cybercrime targeting computers and mobiles	2.4 cybercrime against women and children, 2.5 financial frauds, 2.6 social engineering attacks, malware and ransomware attacks, 2.7 zero day and zero click attacks, 2.8 Cybercriminals modus-operandi , Reporting of cybercrimes,	2.9 Remedial and mitigation measures, 2.10 Legal perspective of cybercrime, IT Act 2000 and its amendments. 2.11 Cybercrime and offences, 2.12 Organizations dealing with Cybercrime and Cyber security in India, SL1. Students, at the end of this module, should be able to understand the cybercrimes, their nature, legal remedies and as to

			how report the crimes through available platforms and procedures.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. define social engineering attacks, malware and ransomware attacks, zero day and zero click attacks.

b. Mini Project:

i. Discuss network security protocols (e.g., SSL/TLS, IPsec).

C .Other Activities (Specify):

Explore firewalls and intrusion detection/prevention systems.

05CA722-A**.3: Develop a deeper understanding and familiarity with various types of cyberattacks, Cyber-crimes.**

Approximate Hours

Item	AppXHrs
Cl	12
LI	0
SW	2
SL	2
Total	16

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO3.1 Understand about Introduction to Social Networks. **SO3.2** Understand Types of Social media, Social media platforms, **SO3.3**Use of Social media monitoring, Hashtag, Viral content, **SO3.4** Understand about Social media marketing,		**Module-3.0 Social Media Overview and Security** 3.1. Introduction to Social networks. 3.2. Types of Social media, 3.3. Social media platforms, 3.4. Social media monitoring, Hashtag, 3.5. Viral content, 3.6. Social media marketing, 3.7. Social media privacy,	SL1. On completion of this module, students should be able to appreciate various privacy and security concerns on online Social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of

SO3.5 Understand about Social media privacy, Challenges, opportunities and pitfalls in online social network		Challenges, 3.8. opportunities and pitfalls in online social network 3.9. Security issues related to social media 3.10. Flagging and reporting of inappropriate content, 3.11. Laws regarding posting of inappropriate content, 3.12. 3.9 Best practices for the use of social media	Social media platforms

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. understand about Flagging and reporting of inappropriate content

b. Mini Project:

i. Explore popular cybersecurity tools (e.g., Wireshark, Nmap, Metasploit).

c. Other Activities (Specify):

Case Study: Provide hands-on examples of tool usage.

05CA722-A**.4: Analyse and evaluate existing legal framework and laws on cyber security. Analyse and evaluate existing legal framework and laws on cyber security.**

Approximate hours

Item	AppXHrs
Cl	12
LI	0
SW	2
SL	2
Total	16

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**

SO4.1 Understand about R Definition of E-Commerce, Main components of E-Commerce **SO4.2**About Elements of E-Commerce security, E-Commerce threats, **SO4.3**understand about E-Commerce security best practices, **SO4.4**understand to digital payments, Components of digital payment and stake holders, **SO4.5** understand about Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments,	.	**Module 4.0 E-Commerce and Digital Payments** 4.1 Definition of E-Commerce, Main components of E-Commerce 4.2 Elements of E-Commerce security, E-Commerce threats, 4.3 E-Commerce security best practices, 4.4 Introduction to digital payments, 4.5 Components of digital payment and stake holders, 4.6 Modes of digital payments- Banking Cards, 4.7 Unified Payment Interface (UPI), e-Wallets, 4.8 Unstructured Supplementary Service Data (USSD), 4.9 Aadhar enabled payments, 4.10 Digital payments related common frauds and preventive measures. 4.11 RBI guidelines on digital payments and customer protection in unauthorized banking transactions. 4.12 Relevant provisions of Payment Settlement Act,2007,	1. Understand the basic concepts related to E-Commerce and digital payments. They will become familiar with various digital payment modes and related cyber security aspects, RBI guidelines and preventive measures against digital payment frauds.

SW-4 Suggested Sessional Work (SW):

a. Assignments:

i. Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments,

b. Mini Project:

i. Analyze real-world cybersecurity incidents.

c. Other Activities (Specify):

Case Study: Explore regulations and compliance requirements.

05CA722-A.**5: Analyse and evaluate the digital payment system security and remedial measures against Digital Payment frauds.**

Approximate hours

Item	AppXHrs
Cl	12
LI	0
SW	2
SL	2
Total	16

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO5.1 Understand about End Point device and Mobile phone security, Password policy, **SO5.2** Security patch management, Data backup, Downloading and management of third party software, Device security policy, **SO5.3**understand about Cyber Security best practices, **SO5.4**understand to Significance of host firewall and Ant-virus,		**Module 5.0 Digital Devices Security , Tools and Technologies** 5.1 End Point device and Mobile phone security, Password policy, 5.2 Security patch management, Data backup, Downloading and management of third-party software, Device security policy, 5.3 Cyber Security best practices, 5.4 Significance of host	1 Students, after completion of this module will be able to understand the basic security aspects related to Computer and Mobiles. They will be able to use basic tools and technologies to protect their devices.

Management of host firewall and Anti-virus, **SO5.5**understand about Wi-Fi security, Configuration of basic security policy and permissions End Point device and Mobile phone security, Password policy,		firewall and Ant-virus, Management of host firewall and Anti-virus, 5.5 Wi-Fi security, Configuration of basic security policy and permissions 5.6 End Point device and Mobile phone security, Password policy, 5.7 Security patch management, Data backup, 5.8 Downloading and management of third party software, 5.9 Device security policy, 5.10 Cyber Security best practices, Significance of host firewall and Ant-virus, 5.11 Management of host firewall and Anti-virus, Wi-Fi security, 5.12 Configuration of basic security policy and permissions.	

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
05CA722-A.1: Recall basics of Cyber security	12	2	2	16
05CA722-A.2: Understand the cyber security Threat landscape.	12	2	2	16

05CA722-A.3: Develop a deeper understanding and familiarity with various types of cyberattacks, cyber-crimes,	12	2	2	16
05CA722-A.4: Analyse and evaluate existing legal framework and laws on cyber Security.	12	2	2	16
05CA722-A.5: Analyse and evaluate the digital payment system security and remedial Measures against digital Payment Frauds.	12	2	2	16
Total Hours	60	10	10	80

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Recall the basics of Cyber Security	05	02	02	09
CO-2	Cybercrime and Cyberlaw	02	03	05	10
CO-3	Social Media Overview and	02	03	06	11

	Security.				
CO-4	E-Commerce and Digital Payments	2	03	05	10
CO-5	Digital Devices Security Tools and Technologies.	-	05	05	10
Total		11	16	23	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Introduction to Cyber Security will be held with writtenexamination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks.

Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

Improved Lecture

1. Tutorial
2. Case Method
3. Group Discussion
4. Role Play
5. Visit to IT Industry.
6. Demonstration
7. ICTBased Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
8. Brainstorming

Suggested Learning Resources:

S. No.	Title	Author	Publisher	Edition &Year

1	Cyber Crime Impact in the New Millennium,	R. C Mishra	Auther Press. Edition	2010
2	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Sumit Belapure and Nina Godbole,	Wiley India Pvt. Ltd.	2011
3	Security in the Digital Age: Social Media Security Threats and Vulnerabilities	Henry A. Oliver	Create Space Independent Publishing Platform	2011
4	Cyber Laws: Intellectual Property & E-Commerce Security	Kumar K, Dominant Publishers		
5	Network Security Bible	Eric Cole, Ronald Krutz, James W. Conley	2nd Edition, Wiley India Pvt. Ltd	

Curriculum Development Team

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COs, POs and PSOs Mapping

Program: BSc IT
Course Code: - 05CA722-A
Course Title: Introduction to Cyber Security

Course Outcomes	Program Outcomes												Program Specific Outcome			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning				
CO 1: Introduction to Cyber security	2	3	3	2	1	2	1	1	1	1	1	2	**2**	**3**	**1**	**2**
CO 2: Understand the cyber security threat landscape	2	2	3	3	1	2	1	1	1	1	1	3	**2**	**2**	**2**	**2**
CO 3: Develop a deeper understanding and familiarity with various types of cyberattacks ,cyber-crimes,	2	3	3	2	1	1	1	1	1	1	1	3	**1**	**1**	**2**	**2**
CO 4: Analyse and evaluate existing legal framework and laws on cyber Security.	2	2	3	3	1	2	1	1	1	1	1	3	**2**	**3**	**1**	**2**
CO 5: Analyse and evaluate the digital payment system security and remedial measures against digital Payment frauds	2	3	3	3	2	2	1	1	1	1	3	3	**2**	**3**	**1**	**1**

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: Introduction to Cyber security	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	Unit-1 : Introduction to Cyber security 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: Cybercrime and Cyber law	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5	Unit-2 : Cybercrime and Cyber law 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 3: Social Media Overview and Security.	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5	Unit-3 **:** Social Media Overview and Security 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 4: E-Commerce and Digital Payments	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5	Unit-4: E-Commerce and Digital Payments 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 5:Digital Devices Security Tools and Technologies.	SO5.1 SO5.2 SO5.3 SO5.4 SO5.5	Unit-5 : Digital Devices Security Tools and Technologies 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application & Information Technology

BSc (Bachelor of Science [Information Technology])

(Revised as on 01 August 2023)

Semester-VII

Course Code: 05CA722-B

Course Title : **AI for Everyone**

Pre- requisite: Student should have good knowledge of mathematics, analytical skills, programming language and ability to understand complex algorithm.

Rationale: Artificial intelligence (AI) has the potential to revolutionize education by providing students with personalized learning experiences, real-time feedback, and access to a wealth of educational resources.

Course Outcomes : After completion of course, students will able to

05CA722-B.1 Understand the basic concepts of AI and machine learning.

05CA722-B.2 Understand the working of self-driving systems.

05CA722-B.3 Understand how to build different AI projects.

05CA722-B.4 Evaluate the impact of AI on society.

05CA722-B.5 Apply AI techniques to any application domain.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
DSE	05CA722-B	AI for everyone	4	0	2	1	6	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	**Scheme of Assessment (Marks)**							
			Progressive Assessment (PRA)						**End Semester Assessment**	**Total Marks**
			Class/ Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	**(ESA)**	(PRA+ESA)
DSE	05CA722-B	AI for everyone	15	20	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom

Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self-Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

05CA722-B**.1 Understand the basic concepts of AI and machine learning.**

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self Learning (SL)**
SO1.1 Understand the concept of machine learning. **SO1.2** Explanation of various terminologies of AI **SO1.3** Understand non technical explanation of deep learning. **SO1.4** Understand Basics of neural network. **SO1.5** Examples and application domains of AI. .		**Unit-1.0 Introduction to Artificial Intelligence.** 1.1. Understanding definition and role of data in machine learning. 1.2. Overview of machine learning. 1.3. Learning various terminologies like deep learning, machine learning and artificial intelligence. 1.4. What do we need to establish an AI company. 1.5. What Machine Learning Can and Cannot Do. 1.6. Understanding basics of neural network like – Neurons, Layers, 1.7. Weights and Biases etc. 1.8. Learning about examples of AI like virtual	1. Understand how to manipulate and prepare data for machine learning.

		assistance, 1.9. Recommendation system, 1.10. Image recognition 1.11. Natural language processing etc. 1.12. Understanding use of AI in various application domain.	

SW-1 Suggested Sessional Work (SW):

a. Assignments:

i) Explore the application of AI in processing and understanding human language.
ii) Explore the societal impacts and ethical considerations of AI.

b. Mini Project:

i) Choose a dataset (e.g., from Kaggle) and load it using a Python library like Pandas. Explore the data, handle missing values, and perform basic preprocessing.

Other Activities (Specify):

Write a short essay or create a presentation discussing the ethical considerations in AI. Address topics like bias, transparency, and accountability.

05CA722-B.**2 Understand the working of self-driving systems.**

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	Laboratory Instruction (LI)	Class room Instruction (CI)	Self Learning (SL)

SO2.1 To Understand the work flow in machine learning and data science projects. **SO2.2** To learn data cleaning, preprocessing, exploring and analyzing. **SO2.3** How to select an AI project for your company. S**O2.4** To process and visualize data. **SO2.5** Learn technical tools for AI and use of python in AI projects.		**Unit-2 Building AI project** 2.1. Workflow of a machine learning project. 2.2. Workflow of a data science project. 2.3. how to use data 2.4. How to choose an AI project-I 2.5. How to choose an AI project-II 2.6. Working with an AI team. 2.7. How to process and visualize data. -I 2.8. How to process and visualize data-II 2.9. Technical tools for AI teams. -I 2.10. Technical tools for AI teams.-II 2.11. use of python in AI related projects -I 2.12. use of python in AI related projects -II	i. Understand the organization's goal and challenges for AI projects. ii. Use libraries like Pandas for cleaning and processing data.

SW-2 Suggested Sessional Work (SW):

a. Assignments:

i. Explore a dataset of your choice. Clean the data, visualize key trends using graphs or charts, and perform basic statistical analysis.

ii. Create a guide or presentation on essential technical tools for AI teams.

b. Mini Project:

Develop a simple AI project using Python. This could be a basic machine learning model, a data analysis task, or a script to interact with an API

c. Other Activities (Specify):

Form a hypothetical AI team and assign roles to each member. Develop a communication plan, set up collaborative tools, and outline a project management strategy for a given AI project.

05CA722-B**.3 Understand how to build different AI projects.**

Approximate Hours

Item	AppX Hrs

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Cl	10
LI	
SW	2
SL	1
Total	13

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self Learning (SL)**
SO3.1 A case study of new smart speaker with advanced AI capabilities **SO3.2** A case study of self-driving car to enhance safety. **SO3.3** Understanding example roles of an AI team. **SO3.4** AI pitfall to avoid project failure. **SO3.5** Survey of major AI application area.		**Unit-3** : **Building AI in your company.** 3.1 The goal is to case study a device that not only plays music but also understands and responds to user commands, acting as a virtual assistant. 3.2 The goal is to case study a device that not only plays music but also understands and responds to user commands, acting as a virtual assistant…continued 3.3 A case study of a self-driving car to enhance safety and provide an autonomous driving experience. 3.4 A case study of a self-driving car to enhance safety and provide an autonomous driving experience continued… 3.5 Evaluate the role of AI project team members.-I 3.6 Evaluate the role of AI project team members-II 3.7 Understanding AI pitfalls to avoid project	i. Clearly outline the goals of the smart speaker, including the desired AI features. ii.Explore the motivation behind creating smart speakers.

		failure.-I 3.8 Understanding AI pitfalls to avoid project failure-II 3.9 Understanding the use of AI in major application areas.-I 3.10. Understanding the use of AI in major application areas. -II	

SW-3 Suggested Sessional Work (SW):

a. Assignments:

i. Introduce the specific smart speaker or brand you will focus on for the case study.

ii. Research and identify at least five common pitfalls associated with AI development and deployment.

b. Mini Project:

Explore the machine learning and AI models used in the development of smart speakers.

Other Activities (Specify):

Speculate on potential future developments in smart speaker technology.

05CA722-B**.4 Evaluate the impact of AI on society.**

Approximate Hours

Item	AppX Hrs
Cl	14
LI	0
SW	2
SL	1
Total	17

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self Learning (SL)**
SO4.1 To understand realistic view of AI. **SO4.2** Understanding the		**Unit-4 : AI and Society** 4.1. Assessment of AI's current capabilities, 4.2. limitations and 4.3. challenges.	i. Find out areas where AI struggles, such as

discrimination/Bias in AI **SO4.3** Understanding adversarial attacks on AI. **SO4.4** Understand adverse uses of AI. **SO4.5** Impact of AI on employment.		4.4. Define the concepts of discrimination and bias in the context of AI. 4.5. Define adversarial attacks and 4.6. their significance in the context of AI with example. 4.7. Explore the ethical implications of using AI for malicious purposes. 4.8. Explore how AI can benefit developing economies, such as improving healthcare, optimizing agriculture, and enhancing education. 4.9. Explore how AI can benefit developing economies, such as improving healthcare, optimizing agriculture, and enhancing education…continued… 4.10. Examine the impact of AI on different sectors of employment.-I 4.11. Examine the impact of AI on different sectors of employment -II 4.12. Discuss instances where AI may lead to job displacement and 4.13. Scenarios where it contributes to job creation. 4.14. Explore how the job market may require new skill sets due to AI integration.	common-sense reasoning, ethical considerations, and the need for massive amounts of data. ii. Explore how bias can emerge in AI systems

SW-4 **Suggested Sessional Work (SW):**

a. Assignments:

i. Highlight AI applications that have made positive impacts, such as healthcare diagnostics, language translation and automation.

ii. Explore how the job market may require new skill sets due to AI integration.

c. Mini Project:

Create a report to discuss potential policy interventions to manage the impact on employment, such as retraining programs and social safety nets.

d. Other Activities (Specify):

Power Point Presentation on adverse uses of AI.

05CA722-B**.5 Apply AI techniques to any application domain**.

Approximate Hours

Item	AppX Hrs
Cl	12
LI	0
SW	2
SL	1
Total	15

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Class room Instruction (CI)**	**Self Learning (SL)**
SO5.1 Explore AI case studies related to a specific domain.	**LI.5.1** Implement self-driving vehicle algorithm. **LI 5.2** Use techniques like one-hot encoding, scaling, and dimensionality reduction. **LI 5.3** Train a neural network using a deep	**Unit 5: AI case studies related to a specific domain.** **5.1** Case study of medical Imaging using AI. **5.2** Case study of Retina scan using AI. **5.3** Case study of Mining surveying using AI. **5.4** Case study of AI in Share Market. **5.5** Case study of Google weather forecasting using AI. **5.6** Case study of smart watch using AI.	1.Try to study some major AI application domains like : Healthcare, finance, retail, Education, manufacturing, autonomous vehicles, Entertainment, agriculture, cybersecurity etc.

	learning library like TensorFlow or PyTorch.	**5.7** Case study of Tesla self driving cars using AI. **5.8** Case study of AI in vaccination development. **5.9** Case study of " HANOOMAN" BharatGPT. **5.10** Case study of AI in Airforce. **5.11** Case study of AI in Defence. **5.12**. Case study of AI in chadrayaan 3.	

SW-5 Suggested Sessional Work (SW):

a. Assignments:

i. Find out uses AI to make trading decisions based on market trends and historical data.

ii. Adapts educational content to individual student needs.

b. Mini Project:

Implement self-driving vehicle algorithm.

c. Other Activities (Specify):

Demonstrate the versatility of AI in addressing complex challenges and optimizing processes across various industries.

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
OE004.1 Understand the basic concepts of AI and machine learning.	12	2	1	15
OE004.2 Understand the working of self-driving systems.	12	2	1	15
OE004.3 Understand how to build different AI projects.	10	2	1	13
OE004.4 Evaluate the impact of AI on society.	14	2	1	17

OE004.5 Apply AI techniques to any application domain.	12	2	1	15
Total Hours	60	10	5	75

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
CO-1	Understand the basic concepts of AI and machine learning.	03	01	01	05
CO-2	Understand the working of self-driving systems.	02	06	02	10
CO-3	Understand how to build different AI projects.	03	07	05	15
CO-4	Evaluate the impact of AI on society.	02	08	05	15
CO-5	Apply AI techniques to any application domain.	03	02	-	05
Total		13	24	13	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for AI for everyone will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Play

6. Case study on AI domain
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook,Twitter, Whatsapp, Mobile, Online sources)
8. Brainstorming

Suggested Learning Resources:

(a) Books :

S. No.	Title	Author	Publisher	Edition & Year
1	Artificial Intelligence: A Modern Approach	Stuart Russell	Prentice Hall	2010
2	Artificial Intelligence: The Basics	Kevin Warwick	Routledge2011	1999
3	Artificial Intelligence for Humans	Jeff Heaton	CreateSpace Independent Publishing	2015
4	https://www.coursera.org/learn/ai-for-everyone#syllabus			
5	https://www.edx.org/course/artificial-intelligence-for-everyone			

COs, POs and PSOs Mapping

Program: B.Sc IT
Course Code : 05CA722-B
Course Title: AI for Everyone

Course Outcomes	Program Outcomes												Program Specific Outcome			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning				
CO 1: Understand the basic concepts of AI and machine learning.	1	1	2	2	3	2	3	2	3	1	3	2	2	3	3	1
CO 2 Understand the working of self-driving systems	1	1	2	2	1	2	3	2	1	1	3	2	2	2	1	1
CO 3: Understand how to build different AI projects	2	2	1	1	1	2	2	2	1	2	1	2	1	1	3	2
CO 4: Evaluate the impact of AI on society.	3	2	2	1	3	2	3	2	2	1	2	3	2	3	3	2
CO 5: Us Apply AI techniques to any application domain.	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO 1: Understand the basic concepts of AI and machine learning	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	LI1.1 LI1.2 LI1.3	Unit-1 1 Introduction to Artificial Intelligence. 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO 2 Understand the working of self-driving systems	SO2.1 SO2.2 SO2.3 SO2.4 SO2.5	LI2.1 LI2.2 LI2.3	Unit-2 Building AI project . 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO 3: Understand how to build different AI projects	SO3.1 SO3.2 SO3.3 SO3.4 SO3.5	LI3.1 LI3.2 LI3.3	Unit-3 Building AI in your company. 3.1,3.2,3.3,3.4,3.5,3.6,3.7	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO 4: Evaluate the impact of AI on society.	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5	LI4.1 LI4.2 LI4.3	Unit-4 AI and Society 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO 5 Apply AI techniques to any application domain.	SO5.1	LI5.1 LI5.2 LI5.3	Unit-5 AI case studies related to a specific domain.5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10,5.11,5.12,	

A K S University

Faculty of Engineering and Technology

Department of Computer Science & Engineering

Curriculum of B.Tech. (Computer Science & Engineering) **Program**

(Revised as on 01 August 2023)

Semester-VII

Course Code: 06CA752

Course Title: Minor Project

Pre- requisite: Student should have knowledge of programming languages, Software Engineering, and Many more tools and framework.

Rationale:

- To apply the knowledge and skills learnt in previous semesters, to solve real life industrial / engineering / professional problems.
- To modify/ improve the existing engineering / professional systems.
- To develop systems / components / methods / processes / resources to cater the needs of the nearby small scale / medium industry.
- To learn to solve real life engineering / professional problems which often have many aspects to be considered and addressed.

Course Outcomes:

06CA752.1: - The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.
06CA752.2: - The student will be able to implement the project plan and manage the project.
06CA752.3: - The student will be able to present the completed project work.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Project	06CA752	Minor Project	0	12	0	0	12	6

The Course on Project Work consists of five phases: -

	Description of phases	Learn Hrs.
1	Literature / industry's need survey and finalization of topic / title	15 Hrs
2	Detailed planning of the project work	
3	Implementing the detailed project plan	60 Hrs
4	Managing the project activities	
5	Reporting of the project work output/outcome / prototype	15 Hrs
	Total	90 Hrs

General Guidelines for Project Work

- The project topics should be related to concerned branch of engineering / profession, but should not be the exact content of the curriculum taughtin the discipline.
- Student's project topics should be preferably 'real life' topics. It means the project topics should have substantial element of uncertainty, complexity and multi-disciplinary-ness which can be coped up by the students. These elements offer opportunities to students to apply engineering/ professional knowledge in real life settings, solve real life problems and to take real life decisions. As a project guide, concerned teacher should ensure these by suitably altering / framing / reframing the statement of topic / title.
- The project topics should be such that students can get opportunity to refer IS codes, Manuals, Handbooks, norms and standards, opportunity to conduct standard tests, and opportunity to operate modern laboratory equipment's following SOPs.
- For student's interest, active participation and ownership in the project work, their self-motivation is necessary. Therefore, students should be actively involved in finalizing the topic of project.
- Students should be asked to conduct a brief review of literature for problems and issues in their engineering / professional areas of interest, where they think they can contribute effectively. The project guide should facilitate them in this regard, through his/her expertise and experience.
- Every student group should be asked to propose at least three topics oftheir interest. The topics proposed by student project groups should be assessed bythe facilitator-teacher on following three criteria: -
    - **The work on the topic should be theoretically and practically feasible.**
    - **The project work on the topic should be completed within approx. Three and half months.**
    - **Availability of required resources should be certain. Cost of project work should also be bearable.**
- Normally, students' project works should be carried out in small groups (1 to 2 students).
- All faculty members of department should be engaged as project guides. Every faculty member should be project guide of at least one student project group.
- Normally, project guides should be assigned to the students through lottery system and students under each faculty should be asked to formtheir small groups.

COs, POs and PSOs Mapping

Course Title: BSc IT
Course Code: 0CA402
Course Title: Minor Project

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1: The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.	2	3	3	2	3	2	3	1	3	1	3	3	2	3	3	1	2
CO 2: The student will be able to implement the project plan and manage the project.	2	3	3	2	3	2	3	1	3	1	3	3	2	2	2	2	3
CO 3: The student will be able to present the completed project work.	2	2	3	1	3	2	2	1	3	1	3	3	2	3	2	2	2

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO 1,2,3,4,5,6,7,8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.	-	-	-	As mentioned in page number _ to _
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: The student will be able to implement the project plan and manage the project.	-	-	-	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 3: The student will be able to present the completed project work.	-	-	-	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application & Information Technology

BSc (Bachelor of Science [Information Technology])

(Revised as on 01 August 2023)

Semester VIII

Course Code: 06RM801

Course Title: English for Research Paper Writing

Pre- requisite: Students should have basic knowledge of presenting themselves, their thoughts and ideas

Rationale: Writing a research paper is the primary channel for passing on knowledge to the scientist working in the same field or related fields. It is important to know the skill of writing papers to demonstrate your ability to understand, relate to what has been learnt, as well as receive critical peer feedback.

06RM801 1: Student will learn how to improve their writing skills, and level of readability

06RM8012: Students will understand the concept of plagiarism, and how to avoid ambiguity and vagueness

06RM8013: Students will learn about what to write in each section of paper

06RM8014: Students will understand significance of each section of paper, and learn how to write it at the same time.

06RM8015: Ensure the good quality of paper at very first-time submission

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Research	06RM801	English for Research Paper Writing	4	0	2	1	7	4

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performances in laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment	Total Marks
			Class/Home Assignment 5 number 3 marks each (CA)	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)	**(ESA)**	(PRA + ESA)
Research	06RM801	English for Research Paper Writing	15	20	5	5	5	50	50	100

Course-Curriculum Detailing

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

06RM801 1: Student will learn how to improve their writing skills, and level of readability

Approximate Hours

Item	Appx Hrs.
Cl	12
LI	0

SW	1
SL	1
Total	14

Session Outcomes (SOs)	**(LI)**	**Class room Instruction (CI)**	**(SL)**
SO1.1 Students learn to design the research paper. SO1.2 Students learn to read the research paper in a systematic way. SO1.3 Examine and identify the redundancy in a research paper SO1.4 Learn to summarise and be concise SO1.5 Understand the concept of ambiguity and vagueness		Unit 1: Preparation of Research Paper 1.1 Steps to introduce to the technique of reading research paper 1.2 Steps to introduce to the technique of reading research paper continued 1.3 Breaking up of sentences, 1.4 Breaking up of sentences continued 1.5 structuring paragraphs 1.6 structuring paragraphs continued 1.7 Making the paper concise 1.8 Making the paper concise continued 1.9 removing redundancy 1.10 removing redundancy Continued 1.11 Concept of Ambiguity and 1.12 Concept of Vagueness	Reading research papers on relevant topics

06RM801.2: Students will understand the concept of plagiarism, and how to avoid ambiguity and vagueness

Approximate Hours

Item	Appx Hours
Cl	12
LI	0

SW	1
SL	1
Total	14

Session Outcomes (SOs)	**(LI)**	**Class room Instruction (CI)**	**Self - Learning (SL)**
SO2.1: Students learn to create a contrast between previous and present work. SO2.2: Learn paraphrasing tool SO2.3: Use of plagiarism check tool SO2.4: Students understand the concept of hedging and criticising	.	UNIT 2 – Paraphrasing and checking Plagiarism 2.1. Clarifying Who Did What, 2.2. Highlighting Your Findings, 2.3. Hedging and 2.4. Criticising, 2.5. Paraphrasing 2.6. Plagiarism 2.7. Clarification of previous work and their order 2.8. Highlighting your work 2.9. Paraphrasing and 2.10. its tools 2.11. Plagiarism Check Software 2.12. Use of Plagiarism Check Software	Learn different AI tools for Writing

06RM801.3: Students will learn about what to write in each section of paper

Approximate Hours

Item	Appx Hours
Cl	12
LI	0
SW	1
SL	1
Total	14

Session Outcomes (SOs)	**(LI)**	**Class room Instruction (CI)**	**(SL)**

SO3.1**:** Students learn to write a research paper in proper format. SO3.2: Students are able to understand different sections of paper. SO3.3: Create an effective abstract and introduction. SO3.4**:** Describe Review of Literature. SO3.5: Learn to write Methodology of Research Paper.	.	Unit-3**:**Planning Sections of a Paper 3.1.Introduction to sections of a research paper. 3.2.Introduction to sections of a research paper continued 3.3.Key skills to write an Abstract and 3.4.Key skills to write an Introduction. 3.5.Skills to write Review of Literature. 3.6.Skills to write Review of Literature continued 3.7.Key skills to write Methodology. -I 3.8.Key skills to write Methodology. -II 3.9.Skills to draw diagrams 3.10. Skills to draw diagrams continued 3.11. Key skills to plot result graphs 3.12. Key skills to write future scope	Study key skills to write the abstract and Methodology

06RM801.4: Students will understand significance of each section of paper, and learn how to writeit at the same time.

Approximate Hours

Item	Appx Hours
Cl	9
LI	0
SW	0
SL	1
Total	10

Session Outcomes (SOs)	**(LI)**	**Class room Instruction (CI)**	**(SL)**

SO4.1: Students learn to state the result of their findings. SO4.2: Students learn to draw conclusions of their research SO4.3: Students are able to analyse and discuss their result of paper SO4.4: Students are able to evaluate their paper SO4.5: Students learn to assess their work through a final check.		Unit-4 : Finalising the Research Paper 4.1 Results of research findings-I 4.2 Results of research findings-II 4.3 Drawing conclusion of the research-I 4.4 Drawing conclusion of the research-II 4.5 Discussion on the result of paper-I 4.6 Discussion on the result of paper-II 4.7 Final check of the paper-I 4.8 Final check of the paper-II 4.9 Discussion of future scope	Study of to find research gaps

.

CO5: Ensure the good quality of paper at very first-time submission

Item	Appx Hours
Cl	12
LI	0
SW	1
SL	1
Total	14

Session Outcomes (SOs)	**(LI)**	**Class room Instruction (CI)**	**(SL)**
SO5.1: Students are able to understand effective research paper writing skills		Unit 5- Research Paper Publication 5.1. Useful Phrases for effective research paper writing-I 5.2. Useful Phrases for effective research paper writing-II	Study of different journals

		5.3. Useful Phrases for effective research paper writing-III 5.4. Selection of appropriate journal 5.5. Selection of appropriate journal 5.6. Identify Predatory journal 5.7. Identify Predatory journal 5.8. Check submission format of research papers 5.9. Check submission format of research papers 5.10. Paper submission techniques-I 5.11. Paper submission techniques-II 5.12. Paper submission techniques-III	

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Sessional Work (SW)	Self-Learning (Sl)	Total hour (Cl+SW+Sl)
CO1: Student will learn how to improve their writing skills, and level of readability	12	1	1	10
CO2: Students will understand the concept of plagiarism, and how to avoid ambiguity and vagueness	12		1	10
CO3: Students will learn about what to write in each section of paper	12		1	10
CO4: Students will understand significance of each section of paper, and learn how to write it at the same time.	12		1	9
CO5: Ensure the good quality of paper at very first-time submission.	12		1	10
Total Hours	60	1	04	49

Suggestion for End Semester Assessment 1

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
1	Unit 1: Preparation of Research Paper	2	5	3	10
2	Unit 2: Paraphrasing and checking Plagiarism	3	4	3	10
3	Unit 3: Planning Sections of a Paper	2	3	5	10
4	Unit 4: Finalising the Research Paper	2	2	6	10
5	Unit 5: Research Paper Publication	1	2	7	10
Total		10	16	24	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for English for Research Paper Writing s will be held with written examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Brainstorming

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

COs, POs and PSOs Mapping

Program: B.Sc. IT
Course Code: 06RM801
Course Title: English for research paper writing

Course Outcomes	Program Outcomes												Program Specific Outcome			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning				
CO 1: : Student will learn how to improve their writing skills, and level of readability	2	2	1	1	3	2	2	3	2	2	1	1	2	3	3	1
CO 2 : Students will understand the concept of plagiarism, and how to avoid ambiguity and vagueness	2	2	2	1	3	2	2	3	2	2	2	1	2	2	2	1
CO 3: Students will learn about what to write in each section of paper	2	3	2	1	3	2	2	3	2	3	2	1	1	1	2	2
CO 4: Students will understand significance of each section of paper, and learn how to write it at the same time	1	-	2	1	1	1	-	-	1	-	2	1	3	3	3	2
CO 5: Ensure the good quality of paper at very first-time submission	1	2	2	1	2	2	1	3	1	2	2	1	3	3	1	3

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO 1: Student will learn how to improve their writing skills, and level of readability	SO1.1 SO1.2 SO1.3 SO1.4 SO1.5	Unit-1 Self-grooming, Basic Etiquettes andPresentation Skill 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9	As mentioned in page number above
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO 2 : Students will understand the concept of plagiarism, and how to avoid ambiguity and vagueness	SO2.1 SO2.2 SO2.3 SO2.4	Unit-2 Confidence building skills, InterviewSkills and Resume Writing 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO 3: Students will learn about what to write in each section of paper	SO3.1 SO3.2 SO3.3 SO3.4 So3.5	Unit-3 Public Speaking Skills& Conversational Skills 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO 4: Students will understand significance of each section of paper, and learn how to write it at the same time	SO4.1 SO4.2 SO4.3 SO4.4 SO4.5	Unit-4 Functional Grammar and Vocabulary Building 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	CO 5: Ensure the good quality of paper at very first-time submission	SO5.1	Unit-5 Indian Writing inEnglish& Hindi Statistics 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application & Information Technology

BSc (Bachelor of Science [Information Technology])

(Revised as on 01 August 2023)

Semester-VIII

Course Code: 01CA811

Course Title : Statistical Thinking for Data Science

Pre-requisite: Student should have basic knowledge of Statistics and database

Rationale: Statistical Thinking for Data Science boosts the discovery of new and unexpected insightsfrom data.

Course Outcomes:

01CA811.1: Understand the statistical foundation for data science

01CA811.2: Apply statistical thinking in collecting, modeling and analyzing data

01CA811.3: Apply statistical thinking in collecting, modeling and analyzing data

01CA811.4: Ability to visualize all types of data

01CA811.5: Understand how to use R for different types of data

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies(Hours/Week)					Total Credits (C)
			Cl	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Major	01CA811.	Statistical Thinking for Data Science	4	4	2	1	11	6

Legend: **CI:** Classroom Instruction (Includes different instructional strategies i.e. Lecture (L) and Tutorial (T) and others),
LI: Laboratory Instruction (Includes Practical performance laboratory workshop, field or other locations using different instructional strategies)
SW: Sessional Work (includes assignment, seminar, mini project etc.),
SL: Self Learning,
C: Credits.

Note: SW & SL has to be planned and performed under the continuous guidance and feedback of teacher to ensure outcome of Learning.

Scheme of Assessment:

Theory

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)							
			Progressive Assessment (PRA)						End Semester Assessment (ESA)	Total Marks (PRA + ESA)
			Class/Home Assignment 5 number 3 marks each	Class Test 2 (2 best out of 3) 10 marks each (CT)	Seminar one (SA)	Class Activity any one (CAT)	Class Attendance (AT)	Total Marks (CA+CT+SA+CAT+AT)		
Major	01CA811.	Statistical Thinking for Data Science	15	20	5	5	5	50	50	100

Practical

Board of Study	Couse Code	Course Title	Scheme of Assessment (Marks)						
			Progressive Assessment (PRA)					End Semester Assessment (ESA)	Total Marks (PRA+ ESA)
			Class/Home Assignment 5 number 3 marks each (CA)	Viva1 (5)	Viva2 (5) (SA)	Class Attendance (AT)	Total Marks (CA+CT+SA+ CAT+AT)		
Major	01CA811	Statistical Thinking Data Science	35	5	5	5	50	50	100

Course-Curriculum Detailing:

This course syllabus illustrates the expected learning achievements, both at the course and session levels, which students are anticipated to accomplish through various modes of instruction including Classroom Instruction (CI), Laboratory Instruction (LI), Sessional Work (SW), and Self Learning (SL). As the course progresses, students should showcase their mastery of Session Outcomes (SOs), culminating in the overall achievement of Course Outcomes (COs) upon the course's conclusion.

01CA811**.1: Understand the statistical foundation for data science**

Approximate Hours

Item	Appx. Hrs.
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
SO1.1 Define Data acquisition **SO1.2** Explain cleaning and aggregation **SO1.3** Explain Exploratory data analysis **SO1.4** Discuss data Visualization **SO1.5** Model creation and validation .	LI1.1. Calculate the mean, median, and mode for a given dataset. LI1.2. Determine the standard deviation and variance of a set of data points. LI1.3. Create a histogram and interpret the distribution of a dataset. LI1.4 Demonstrate feature Engineering LI1.5 Demonstrate model creation LI1.6 Demonstrate Aggreation in Dataset.	**Unit 1: Introduction to Data Science: (9 lecture)** 1.1 Data acquisition-I 1.2 Data acquisition-II 1.3 Cleaning-I 1.4 Cleaning-II 1.5 Aggregation-I 1.6 Aggregation-II 1.7 Exploratory data analysis-I 1.8 Exploratory data analysis-II 1.9 Visualization 1.10 Feature engineering 1.11 Model creation and 1.12 validation	1. Learn Feature engineering

SW-1 Suggested Sessional Work (SW):

a. Assignments:

(i) Discuss about different techniques of data analysis

b. Presentation

01CA811**.2: Apply statistical thinking in collecting, modeling and analyzing data**

Approximate Hours

Item	AppX Hrs
Cl	12

LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO2.1 To Understand Statistical Thinking, **SO2.2** To learn different approaches of data sampling **SO2.3** To Explain Probability **SO2.4** To Explain Statistical Inference	LI2.1. Apply the concept of conditional probability to a real-world scenario. LI2.2. Use the binomial distribution to model a probability scenario. LI2.3. Apply the normal distribution to solve a problem involving z-scores. LI2.4 apply different types of Bias. LI2.5 Apply statistical Inference LI2.6 Apply concepts of Statistical inference.	**Unit-2: Statistical Thinking 1(9 lectures)** 2.1 Examples of Statistical Thinking, 2.2 Numerical Data 2.3 Summary Statistics 2.4 From Population to Sampled Data 2.5 Different Types of Biases-I 2.6 Different Types of Biases -II 2.8 Introduction to Probability 2.9 Concepts of Probability-I 2.10 Concepts of Probability-II Introduction to Statistical Inference 2.12 Concepts of Statistical Inference	1. learn different types of Biases.

SW-2 Suggested Seasonal Work (SW):

a. Assignments:

(i) Write about numerical data?

b. Presentation

01CA811**.3: Apply statistical thinking in collecting, modeling and analyzing data**

Approximate Hours

Item	AppX Hrs
Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO3. 1 To understand Association and Dependence SO3.2 know the Conditional Probability and Bays Rule SO3.3 To understand the Linear Regression. SO3.4 develop a Special Regression Model	LI3.1. Compute probabilities for simple events and joint events. LI3.2. Calculate the margin of error and construct a confidence interval. LI3.3. Perform a hypothesis test and interpret the results.	**Unit3:Statistical Thinking 2 (9 lecture)** 3.1 Association and Dependence 3.2 Association and Causation 3.3 Conditional Probability-I 3.4 Conditional Probability-II 3.5 Bays Rule 3.6 Example of Bays Rule 3.7 Simpsons Paradox 3.8 Example 3.9 Confounding 3.10 Introduction to Linear Regression 3.11 Questions based on linear regression 3.12 Special Regression Model.	I. Learn about Simpsons Paradox

SW-2 Suggested Seasonal Work (SW):

a. Assignments:

(i) Explain Association and Causation

b. Presentation

01CA811**.4: Ability to visualize all types of data**

Approximate Hours

Item	App X Hrs
Cl	12
LI	12

SW	1
SL	1
Total	26

Session Out comes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO4.1 To Understand the Goals of statistical graphics and data visualization **SO4.2** Explain the Graphs of Data **SO4.3** implement Graphs of Fitted Models **SO4.4** To Understand the Principles of graphics	LI4.1. Use autocorrelation and partial autocorrelation functions in time series analysis. LI4.2. Apply ARIMA modeling to make predictions in a time series dataset. LI4.3. Evaluate the accuracy of time series forecasts using appropriate metrics. LI4.4 Visualize heat map. LI4.5 Make a graph of a dataset. LI4.6 Make a graph Fitted Model.	**Unit-4 : Exploratory Data Analysis and Visualization (9 lectures)** 4.1. Goals of statistical graphics and 4.2. data visualization 4.3. Graphs of Data-I 4.4. Graphs of Data-II 4.5. Graphs of Fitted Models-I 4.6. Graphs of Fitted Models 4.7. -II 4.8. Graphs to Check Fitted Models-I 4.9. Graphs to Check Fitted Models-II 4.10. What makes a good graph? 4.11. Principles of graphics.-I 4.12. Principles of graphics.-II	i. Draw a different graphs to fitted models

SW-4 Suggested Seasonal Work (SW):

a. Assignments:

(i) Write the Principles of graphics?

b. Presentation

c. Pictorial representation of different graphs for data visualization.

01CA811.5**: Understand how to use R for different types of data**

Approximate Hours

Item	AppX Hrs

Cl	12
LI	12
SW	1
SL	1
Total	26

Session Outcomes (SOs)	**Laboratory Instruction (LI)**	**Classroom Instruction (CI)**	**Self-Learning (SL)**
SO5.1To Understand Bayesian inference **SO5.2** Discuss combining models and data in a forecasting problem **SO5.3** To Explain Bayesian hierarchical modeling for studying public opinion **SO5.4** To Understand Bayesian modeling for Big Data	LI5.1. Apply Bayes' Theorem to update probabilities based on new information. LI5.2. Identify trends and seasonality in a time series dataset. LI5.3. Develop a research question for a data science project. LI5.4 Create Bayesian model. LI5.5 Create Bayesian model for hierarical modeling. LI5.6 Case study of Bayesian model for forcasting.	**Unit5: Introduction to Bayesian Modeling (8 lectures)** 5.1 Bayesian inference-I 5.2 Bayesian inference-II 5.3 combining models and data 5.4 combining models and data 5.5 forecasting problem 5.6 forecasting problem 5.7 Bayesian hierarchical modeling 5.8 Bayesian hierarchical modeling 5.9 studying public opinion 5.10 studying public opinion 5.11 Bayesian modeling for Big Data 5.12 Bayesian modeling for Big Data	I. Learn forecasting problem

SW-5Suggested Seasonal Work (SW):

- **a. Assignments:**
  - (i) Explain in detail about Bayesian hierarchical modeling
- **b.** Presentation:
- **c. Other Activities (Specify): Group discussion of important topics.**

Brief of Hours suggested for the Course Outcome

Course Outcomes	Class Lecture (Cl)	Laboratory Instruction(LI)	Sessional Work (SW)	Self Learning (Sl)	Total hour (Cl+SW+Sl)
01CA811.**1.**Understand the statistical foundation for data science	12	12	1	1	**26**
01CA811.**2** Apply statistical thinking in collecting, modeling and analyzing data	12	12	1	1	**26**
01CA811.**3** Apply statistical thinking in collecting, modeling and analyzing data	12	12	1	1	**26**
01CA811.**4** Ability to visualize all types of data	12	12	1	1	**26**
01CA811.**5** Understand how to use R for different types of data	12	12	1	1	**26**
Total Hours	60	60	5	5	130

Suggestion for End Semester Assessment

Suggested Specification Table (For ESA)

CO	Unit Titles	Marks Distribution			Total Marks
		R	U	A	
01CA811-1	Unit 1: Introduction to Data Science	03	02	03	08
01CA811-2	Unit-2: Statistical Thinking 1	03	01	05	09
01CA811-3	Unit3:Statistical Thinking2	03	07	02	12
01CA811-4	Unit-4 : Exploratory Data Analysis and Visualization	03	05	05	13
01CA811.5	Unit5: Introduction to Bayesian Modeling	03	02	03	08
Total		15	17	18	50

Legend: R: Remember, U: Understand, A: Apply

The end of semester assessment for Statistical Thinking for Data Science will be held with written

examination of 50 marks

Note. Detailed Assessment rubric need to be prepared by the course wise teachers for above tasks. Teachers can also design different tasks as per requirement, for end semester assessment.

Suggested Instructional/Implementation Strategies:

1. Improved Lecture
2. Tutorial
3. Case Method
4. Group Discussion
5. Role Pla
6. Demonstration
7. ICT Based Teaching Learning (Video Demonstration/Tutorials CBT, Blog, Facebook, Twitter, WhatsApp, Mobile, Online sources)
8. Brainstorming

Suggested Learning Resources:

A. Books:

S. No.	Title	Author	Publisher	Edition & Year
1	Computational Thinking: A Primer For Programmers And Data Scientists	G Venkatesh	Notion Press	2022
2	Data Science A Beginner's Guide	C. Raju	Penguin Random House	2023

B. Alternative NPTEL/SWAYAM/MOOC Course (if any): NA

Curriculum Development Team

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COs, POs and PSOs Mapping

Course Title: B. Sc. IT
Course Code: 01CA811
Course Title: Statistical Thinking for Data Science

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO1 Understand the statistical foundation for data science	1	1	2	2	3	2	3	2	2	1	3	2	2	3	3	1	2
CO2 Apply statistical thinking in collecting, modeling and analyzing data	1	1	2	2	1	2	3	2	1	1	2	2	2	2	2	1	3
CO3 Apply statistical thinking in collecting, modeling and analyzing data	3	2	2	2	3	2	3	2	2	1	2	3	3	3	3	2	2
CO4 Ability to visualize all types of data	-	-	-	1	1	3	3	3	1	1	2	2	3	3	1	3	3
CO5 Understand how to use R for different types of data	2	3	1	1	2	3	-	-	2	-	2	2	3	2	2	3	2

Legend: 1 – Low, 2 – Medium, 3 – High

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction(CI)	Self-Learning(SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	**CO1** Understand the statistical foundation for data science	SO1.1 SO1.2 SO1.3 SO1.4	LI1.1,LI1.2,LI1 .3	**Unit 1: Introduction to Data Science: (9 lecture)** 1.1,1.2,1.3,1.4,1.5,1.6,1.7,1.8,1.9,1.10,1.11,1.12	As mentioned in page number above
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	**CO2** Apply statistical thinking in collecting, modeling and analyzing data	SO2.1 SO2.2 SO2.3 SO2.4	LI2.1,LI2.2,LI2 .3	**Unit-2: Statistical Thinking 1** 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7,2.8,2.9,2.10,2.11,2.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	**CO3** Apply statistical thinking in collecting, modeling and analyzing data	SO3.1 SO3.2 SO3.3 SO3.4	LI3.1,LI3.2,LI3 .3	**Unit3:Statistical Thinking2** 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8,3.9,3.10,3.11,3.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	**CO4** Ability to visualize all types of data	SO4.1 SO4.2 SO4.3 SO4.4	LI4.1,LI4.2,LI4 .3	**Unit-4 : Exploratory Data Analysis and Visualization** 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9,4.10,4.11,4.12	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4	**CO5** Understand how to use R for different types of data	SO5.1 SO5.2 SO5.3 SO5.4	LI5.1,LI5.2,LI5 .3	**Unit5: Introduction to Bayesian Modeling** 5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,5.10,5.11,5.12	

A K S University

Faculty of Computer Application & Information Technology and Science

Department of Computer Application & Information Technology

BSc (Bachelor of Science [Information Technology])

(Revised as on 01 August 2023)

Semester-VIII

Course Code: 06CA852

Course Title: Research Project/Thesis Submission

Pre- requisite: Student should have knowledge of programming languages, Software Engineering, and Many more tools and framework.

Rationale:

- To apply the knowledge and skills learnt in previous semesters, to solve real life industrial / engineering / professional problems.
- To modify/ improve the existing engineering / professional systems.
- To develop systems / components / methods / processes / resources to cater the needs of the nearby small scale / medium industry.
- To learn to solve real life engineering / professional problems which often have many aspects to be considered and addressed.

Course Outcomes:

06CA852.1: - The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.
06CA852.2: - The student will be able to implement the project plan and manage the project.
06CA852.3: - The student will be able to present the completed project work.

Scheme of Studies:

Board of Study	Course Code	Course Title	Scheme of studies (Hours/Week)					Total Credits (C)
			CI	LI	SW	SL	Total Study Hours (CI+LI+SW+SL)	
Project	06CA852	Research Project/Thesis Submission	0	20	0	0	20	10

The Course on Project Work consists of five phases: -

	Description of phases	Learn Hrs.
1	Literature / industry's need survey and finalization of topic / title	15 Hrs
2	Detailed planning of the project work	
3	Implementing the detailed project plan	60 Hrs
4	Managing the project activities	
5	Reporting of the project work output/outcome / prototype	15 Hrs
	Total	90 Hrs

General Guidelines for Project Work

- The project topics should be related to concerned branch of engineering / profession, but should not be the exact content of the curriculum taughtin the discipline.
- Student's project topics should be preferably 'real life' topics. It means the project topics should have substantial element of uncertainty, complexity and multi-disciplinary-ness which can be coped up by the students. These elements offer opportunities to students to apply engineering/ professional knowledge in real life settings, solve real life problems and to take real life decisions. As a project guide, concerned teacher should ensure these by suitably altering / framing / reframing the statement of topic / title.
- The project topics should be such that students can get opportunity to refer IS codes, Manuals, Handbooks, norms and standards, opportunity to conduct standard tests, and opportunity to operate modern laboratory equipment's following SOPs.
- For student's interest, active participation and ownership in the project work, their self-motivation is necessary. Therefore, students should be actively involved in finalizing the topic of project.
- Students should be asked to conduct a brief review of literature for problems and issues in their engineering / professional areas of interest, where they think they can contribute effectively. The project guide should facilitate them in this regard, through his/her expertise and experience.
- Every student group should be asked to propose at least three topics oftheir interest. The topics proposed by student project groups should be assessed bythe facilitator-teacher on following three criteria: -
    - **The work on the topic should be theoretically and practically feasible.**
    - **The project work on the topic should be completed within approx. Three and half months.**
    - **Availability of required resources should be certain. Cost of project work should also be bearable.**
- Normally, students' project works should be carried out in small groups and thesis by one only.
- All faculty members of department should be engaged as project guides. Every faculty member should be project guide of at least one student project group.
- Normally, project guides should be assigned to the students through lottery system and students under each faculty should be asked to formtheir small groups.

COs, POs and PSOs Mapping

Course Title: BSc IT
Course Code: 06CA852
Course Title: Research Project/Thesis Submission

Course Outcomes	Program Outcomes												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PS0 5
	Engineering knowledge	Problem analysis	Design/development of solutions	Conduct studies of difficult problems	Utilization of modern tools	Engineers and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-longlearning	Use fundamental knowledge of math, science, and engineering to comprehend, evaluate, and create computer Programmes in the fields of algorithms, multimedia, big data analytics, machine learning, artificial intelligence, and networking for the effective design of computer-based systems of various complexity	Utilize relevant methods and cutting-edge hardware and software engineering tools to develop and integrate computer systems and related technologies. This PSO2 also encourages lifelong learning for the advancement of technology and its use in multidisciplinary settings	Applying professional engineering solutions for societal improvement while taking into account the environmental context, being conscious of professional ethics, and being able to effectively communicate.	Learn and use the most recent Artificial Intelligence and Data Science technologies in the fields of engineering and computer science	Recognize and examine issues in real life, then offer creative software solutions with the help of AI and Data Science Technologies.
CO 1: The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.	2	3	3	2	3	2	3	1	3	1	3	3	2	3	3	1	2
CO 2: The student will be able to implement the project plan and manage the project.	2	3	3	2	3	2	3	1	3	1	3	3	2	2	2	2	3
CO 3: The student will be able to present the completed project work.	2	2	3	1	3	2	2	1	3	1	3	3	2	3	2	2	2

Course Curriculum Map

POs & PSOs No.	COs No.& Titles	SOs No.	Laboratory Instruction (LI)	Classroom Instruction (CI)	Self-Learning (SL)
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 1: The student will be able to prepare a detailed project plan for solving any real-life related engineering / technical / professional / industrial problem.	-	-	-	As mentioned in page number above
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 2: The student will be able to implement the project plan and manage the project.	-	-	-	
PO 1,2,3,4,5,6,7, 8,9,10,11,12 PSO 1,2, 3, 4, 5	CO 3: The student will be able to present the completed project work.	-	-	-	