

## Self-Study Report (SSR) - **Criterion-1**

### **Information to be submitted by Departments/Directorates/Centres for Each Programme Offered**

Department/Directorate/Centre/Institute:	Department of Computer Science, University of Kashmir				
Name of the Programme Offered:	MCA				
Departmental website link of the complete/updated syllabus:	<a href="https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Custom/Updated%20Syllabus%20MCA_2021.pdf">https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Custom/Updated%20Syllabus%20MCA_2021.pdf</a>				
MCA-8 courses/semester offered - 32 courses including project courses (8) credit/semester =24					
Number of New Courses introduced in the Programme since 2019? MCA - 02    1. <a href="#">Multimedia Systems</a> 2. <a href="#">Wireless &amp; Mobile Computing</a>					
List of <b>New Courses</b> introduced since 2019:					
<i>Course Code</i>	<i>Course Title</i>	<i>Programme</i>	<i>Brief Description</i>		
MCA18004CR	<a href="#">Multimedia Systems</a>	MCA	To introduce various aspects of multimedia components like Images, audio, sound and computer graphics		
MCA21306DCE	<a href="#">Wireless &amp; Mobile Computing</a>	MCA	The student will be able to understand the new trends in mobile/wireless communications networks. understand multiple radio access techniques. analyze various routing algorithms used in mobile/wireless networks. identify the issues in transport and application layers.		
Departmental website link in support of New Courses introduced in the Programme since <b>2019</b> .		<a href="https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Custom/Doc11233.pdf">https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Custom/Doc11233.pdf</a>			
Dates of syllabus revisions during the last five years. <b>(2019-2023)</b>		2018	2019	2020	2021

Departmental website link in support of syllabus revisions.	<a href="https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Custom/BOS%2025-9-2020.pdf">https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Custom/BOS%2025-9-2020.pdf</a>	
Are Programme Outcomes (POs) clearly mentioned in the syllabus? (Y/N) Y	<a href="https://cs.uok.edu.in/Main/ViewPage.aspx?Page=Programme_Outcome">https://cs.uok.edu.in/Main/ViewPage.aspx?Page=Programme_Outcome</a>	
Are the Course Outcomes (COs) mentioned for each course of the programme? (Y/N) N		
Does POs & COs have relevance to local, regional & global developmental needs? (Y/N) Y	<a href="https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Menu/Programme_Relevance_a9db5414-ffe1-47c2-bd74-a65248fb1351.pdf">https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Menu/Programme_Relevance_a9db5414-ffe1-47c2-bd74-a65248fb1351.pdf</a>	
List of courses addressing <b>Local Needs:</b>		
Course Code	Course Title	Brief Justification
MCA21102CR	<a href="#">Database Systems</a>	Database Management Systems (DBMS) address local needs by efficiently organizing, managing, and retrieving data for businesses, institutions, and organizations, enhancing data accessibility and decision-making within specific communities or regions.
MCA21203CR	<a href="#">Artificial Intelligence</a>	Artificial Intelligence (AI) addresses local needs by providing tailored solutions for automation, data analysis, and decision support, enhancing efficiency and problem-solving in specific industries and communities.
MCA21202CR	<a href="#">Python</a>	Offering foundational programming skills that are essential for careers in software development, data analysis, and automation.
MCA21205DCE	<a href="#">Web Programming</a>	Empowering students to create dynamic websites, paving the way for careers in web development and digital entrepreneurship
List of courses addressing <b>Regional Needs:</b>		
Course Code	Course Title	Brief Justification
MCA21102CR	<a href="#">Database Systems</a>	Enabling efficient data management for local governance, healthcare, and educational institutions, improving service delivery

MCA21304CR	<a href="#">Machine Learning</a>	Driving innovation in agriculture and disaster management by applying predictive models to local environmental and economic challenges
MCA21204CR	<a href="#">Software Engineering</a>	Software Engineering addresses regional needs by developing tailored software solutions that support local businesses, government initiatives, and community-driven projects.
MCA21205DCE	Web Programming	Supporting local artisans and businesses in creating an online presence, promoting regional products and services to broader markets

List of courses addressing **Global Needs:**

<i>Course Code</i>	<i>Course Title</i>	<i>Brief Justification</i>
MCA21207DCE	<a href="#">Computer Graphics and Multimedia</a>	Computer graphics and multimedia address global needs by enabling rich visual communication, interactive experiences, and data representation across diverse applications, from entertainment to education and virtual collaboration.
MCA21304CR	<a href="#">Machine Learning</a>	Addressing global challenges in areas like climate change, healthcare, and cybersecurity through advanced predictive analytics and automation
MCA21205DCE	<a href="#">Web Programming</a>	Enabling the creation of dynamic and scalable websites that drive global e-commerce, communication, and information sharing

Does the Programme offer focus on Employability/ Entrepreneurship/ Skill development courses? (Y/N)

List of **Employability Courses:**

<i>Course Code</i>	<i>Course Title</i>	<i>Brief Justification</i>
MCA21102CR	<a href="#">Database Systems</a>	Database Systems secure positions such as Database Administrator or Data Analyst in sectors like finance
MCA21304CR	<a href="#">Machine Learning</a>	Machine Learning secures roles like Machine Learning Engineer or Data Scientist in technology, research, and AI-focused industries
MCA21202CR	<a href="#">Python</a>	Python secures employment as a Software Developer or Data Analyst in tech companies, startups, and enterprises that rely on programming and data analysis

MCA21205DCE	<a href="#">Web Programming</a>	Web Programming secures opportunities as a Web Developer or Front-End Engineer in digital agencies, e-commerce companies, and technology firms
MCA21103CR	<a href="#">Computer Networks</a>	Equips one with the skills to design, manage, and secure networks, essential for roles in IT infrastructure.

List of **Entrepreneurship Development Courses:**

<i>Course Code</i>	<i>Course Title</i>	<i>Brief Justification</i>
MCA21307DCE	<a href="#">ORGANISATIONAL BEHIOUR</a>	Organizational Behaviour fosters ethical leadership and teamwork, ensuring integrity and respect in professional environments
MCA21401OE	<a href="#">MANAGEMENT INFORMATION SYSTEM</a>	Management Information Systems instill the ethical management of information, ensuring data integrity and responsible decision-making in business operations."
MCA21104CR	<a href="#">ACCOUNTING AND MANAGEMENT CONTROL</a>	Accounting as an Entrepreneurship Development course equips aspiring entrepreneurs with the financial acumen to effectively manage resources, analyze costs, and drive sustainable business growth.

List of **Skill development Courses:**

<i>Course Code</i>	<i>Course Title</i>	<i>Brief Justification</i>
MCA21102CR	<a href="#">Database Systems</a>	Database Systems as a skill development course equips you to manage and analyze data efficiently, essential for roles in IT, finance, and healthcare
MCA21304CR	<a href="#">Machine Learning</a>	Machine Learning as a skill development course trains you in advanced analytics and AI, preparing you for positions in tech, research, and innovation-driven fields.
MCA21202CR	<a href="#">Python</a>	Python as a skill development course provides you with versatile programming skills, opening doors to careers in software development, data analysis, and automation.

Does the programme have courses addressing Professional ethics/ gender/ human values/ environment/ sustainability & other value framework enshrined in NEP2020/etc. (Y/N) Y

List of courses addressing **Professional Ethics:**

<i>Course Code</i>	<i>Course Title</i>	<i>Brief Justification</i>
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MCA21307DCE	<a href="#">ORGANISATIONAL BEHAVIOUR</a>	Organizational Behaviour fosters ethical leadership and teamwork, ensuring integrity and respect in professional environments
MCA21401OE	MANAGEMENT INFORMATION SYSTEM	Management Information Systems instill the ethical management of information, ensuring data integrity and responsible decision-making in business operations.
List of courses addressing <b>Gender Issues:</b>		
<i>Course Code</i>	<i>Course Title</i>	<i>Brief Justification</i>
SW24401CR	Social Justice and Human Rights (OE)	Social Justice and Human Rights examines the intersection of gender with broader social justice and human rights frameworks, focusing on advocating for equity and addressing systemic inequalities.
List of courses addressing <b>Human Value Issues:</b>		
<i>Course Code</i>	<i>Course Title</i>	<i>Brief Justification</i>
EVS422J1	Human and Environment (OE)	Explores the complex interactions between human activities and natural ecosystems, focusing on sustainable solutions to address pressing environmental challenges."
List of courses addressing <b>Environment Issues:</b>		
<i>Course Code</i>	<i>Course Title</i>	<i>Brief Justification</i>
EVS124J	Environment and Ecology (OE)	Environment and ecology address environmental issues by studying the interactions between organisms and their surroundings, highlighting the impact of human activities on natural ecosystems, and promoting sustainable practices to protect and preserve natural resources for future generations.
List of courses addressing <b>Sustainability issues:</b>		
<i>Course Code</i>	<i>Course Title</i>	<i>Brief Justification</i>
EVS622J1	Environmental Economics and Sustainable Development (OE)	Examines the economic principles underlying environmental policies and strategies, aiming to promote sustainable development and address global environmental challenges."
List of courses addressing <b>Other Value Framework enshrined in NEP2020/etc.:</b>		
<i>Course Code</i>	<i>Course Title</i>	<i>Brief Justification</i>

MCA21301CR	<a href="#">Design and Analysis Algorithms</a>	Design and Analysis of Algorithms promote logical thinking and problem-solving, essential values for innovation and efficient resource management.
MCA21303CR	<a href="#">Operating Systems</a>	Operating Systems instill the value of system efficiency and reliability, crucial for maintaining stable and secure technological environments
MCA21204CR	<a href="#">Software Engineering</a>	Software Engineering embodies the values of teamwork, quality assurance, and ethical responsibility, ensuring the development of reliable and user-centric software solutions

Does the Department/Directorate/Institute/ Centre offer Diploma Programme? (Y/N) **N**

Details of the **Diploma Programmes** offered by the institutions where the students of the institution have enrolled and successfully completed during the last five years (2019-2023)

<i>Programme Code</i>	<i>Name of Diploma Programme</i>	<i>Mode of Programme (Online/Offline)</i>	<i>Year of Offering/enrolment</i>	<i>Contact hours of course</i>	<i>Number of students enrolled in the year</i>	<i>Number of Students completing the course in the year</i>	<i>Departmental website link to the relevant document</i>	<i>Number of students enrolled in the year</i>
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Does the Department/Directorate/Institute/ Centre offer Certificate Courses? (Y/N) **N**

Details of the **Certificate Courses** offered by the institutions where the students of the institution have enrolled and successfully completed during the last five years (2019-2023)

<i>Course Code</i>	<i>Name of Certificate Course</i>	<i>Mode of Course (Online/Offline)</i>	<i>Year of Offering/enrolment</i>	<i>Contact hours of course</i>	<i>Number of students enrolled in the year</i>	<i>Number of Students completing the course in the year</i>	<i>Departmental website link to the relevant document</i>	<i>Number of students enrolled in the year</i>
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Does the Department/Directorate/Institute/ Centre offer Value-Added Courses? (Y/N) N</b>								
<b>Details of the Value Added Courses offered by the institutions where the students of the institution have enrolled and successfully completed during the last five years (2019-2023)</b>								
<i>Course Code</i>	<i>Name of Value-Added Course</i>	<i>Mode of Course (Online/Offline)</i>	<i>Year of Offering/enrolment</i>	<i>Contact hours of course</i>	<i>Number of students enrolled in the year</i>	<i>Number of Students completing the course in the year</i>	<i>Departmental website link to the relevant document</i>	<i>Number of students enrolled in the year</i>
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Does the Department/Directorate/Institute/ Centre offer Online Courses of MOOCs, SWAYAM/e-PG Pathshala/ NPTEL and other recognized platforms? (Y/N)</b>								Y

Details of **Online Courses of MOOCs, SWAYAM/e-PG Pathshala/ NPTEL and other recognized platforms** where the students of the institution have enrolled and successfully completed during the last five years (2019-2023)

Course Code	Name of the Course	Mode of the Course-offered by the HEI or Online (Specify the platform like MOOCs, SWAYAM, etc.)	Year of Offering/enrolment	Contact hours of course	Number of students enrolled in the year	Number of Students completing the course in the year	Departmental website link to the relevant document	Number of students enrolled in the year
Design and Analysis of Algorithms	<a href="#">Design and Analysis of Algorithms</a>	SWAYAM 2	2020-2023	48 hours	N/A	8883	<a href="https://cs.uok.edu.in/Main/ViewPage.aspx?Page=Swayam_Courses">https://cs.uok.edu.in/Main/ViewPage.aspx?Page=Swayam_Courses</a>	

Does the programme have Field Projects/ Research Projects /Internship in the programme? (Y/N) Y

Details of components of **Field Projects / Research Projects / Internships** implemented during last five years (2019-2023)

Course Code	Name of the course pertaining to field projects/ Research Projects /Internship	Number of Credits	Number of students undertaking course	Departmental website link to the relevant document
MCA21401CR	Project Problem Identification	4	62	<a href="https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Alert/Project_Allocation_1995a35e-7caa-44e1-b55c-c811895f6a2a.pdf">https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Alert/Project_Allocation_1995a35e-7caa-44e1-b55c-c811895f6a2a.pdf</a>
MCA21402CR	Project Problem Analysis	4		
MCA21403CR	Project Dissertation	6		
MCA21404DCE	Project In-Home Software Developmnt	4		
MCA21405DCE	Project - In-Home Research Component	4		
MCA21406DCE	Project Industrial Software Developmnt	4		



MCA21407DCE	Project Industrial Research Component	4		
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**Any other Relevant Information:**

<b>COURSE TITLE: Computer Graphics and Multimedia</b>							
<b>Course Code</b>				<b>: MCA21207DCE</b>		<b>Examination Scheme</b>	
<b>Total number of Lecture Hours: 40</b>						<b>External</b>	<b>80</b>
						<b>Internal</b>	<b>20</b>
<b>Lecture (L):</b>	<b>3</b>	<b>Practical(P):</b>	<b>2</b>	<b>Tutorial (T):</b>	<b>0</b>	<b>Total Credits</b>	<b>4</b>
<b>Course Objectives:</b>							
<ul style="list-style-type: none"> <li>• <b>Understand Computer Graphics Principles:</b> Grasp the fundamental concepts and applications of computer graphics, including graphic display devices and 2D/3D transformations.</li> <li>• <b>Implement Graphics Algorithms:</b> Develop skills in essential graphics algorithms such as line and circle drawing, clipping, filling, and hidden surface removal.</li> <li>• <b>Work with Curves and Surfaces:</b> Apply mathematical techniques for curves and surfaces, including spline and Bezier methods, for creating complex graphical models.</li> <li>• <b>Integrate Multimedia Elements:</b> Learn about multimedia concepts, file formats, and storage solutions to create and manage multimedia content effectively. Introductory concepts of AR &amp; VR technologies.</li> </ul>							
<b>Course Content</b>						<b>TEACHING HOURS</b>	
<b>UNIT 1: Unit Heading</b>						<b>10Hrs</b>	
Introduction to Computer Graphics, Applications of Computer Graphics, Graphic Display Devices: Refresh Cathode Ray Tubes, Raster-scan Displays, Random-Scan displays, Color CRT Monitors, Concept of Double Buffering, Lookup tables. 2-D Graphics: Cartesian and Homogeneous Coordinate Systems, Line drawing algorithms (Bressenham's and DDA), Circle and Ellipse Drawing Algorithms.							
<b>UNIT 2: Unit Heading</b>						<b>10Hrs</b>	
2-Dimensional Transformations, Concepts of Window & Viewport, Window to Viewport Transformations, Normalization transformation (3L) Composite Transformations: General pivot point rotation, General fixed point scaling, reflection w.r.t line $y=x$ , reflection w.r.t line $y=x$ (4L) Transformation between coordinate systems, affine transformations, Raster methods for transformations (3L)							

<b>UNIT 3: Unit Heading</b>	<b>10Hrs</b>
Filling techniques: Boundary and Flood-fill algorithms (2L) Clipping, Line Clipping Algorithms (Cohen-Sutherland Algorithm), 3-D Graphics, Projections: perspective and parallel projection transformations. (5L) 3-Dimensional Transformations, Hidden Surface Removal Techniques, Z-Buffer Algorithm, Back Face Detection (3L)	
<b>UNIT 4: Unit Heading</b>	<b>10Hrs</b>
Curves and Surfaces: Spline specification, Interpolated & Approximated Splines. spline representation, cubic spline interpolation methods, Bezier Splines, Bezier Curves, Cubic Bezier Curves, Bezier Surfaces. (3L) Introduction to multimedia elements: Images (BMP, PCX), sound (WAV, MP3) Multimedia storage formats: CDs and DVDs).	
<b>Lab Manual</b>	
<p><b>Lab Sheet 1</b>  <b>Unit I:</b>  Q1. Write a C++ program to draw line.  Q2. Write a C++ program to draw circle.  Q3. Write a C++ program to draw pixel.</p> <p><b>Lab Sheet 2</b>  <b>Unit I:</b>  Q1. Write a C++ program to draw line using DDA algorithm.  Q2. Write a C++ program to implement Brenham's algorithm to draw line.</p> <p><b>Lab Sheet 3</b>  <b>Unit I:</b>  Q1. Write a C++ program to implement Mid-Point Algorithm to draw Circle.  Q2. Write a C++ program to implement Mid-Point Algorithm to draw Ellipse.</p> <p><b>Lab Sheet 1</b>  <b>Unit II:</b>  Q1. Write a program to apply Translation to 2D shapes</p>	

- Q2. Write a program to apply Scaling to 2D shapes
- Q3. Write a program to apply reflection along X axis to 2D shapes
- Q4. Write a program to apply reflection along Y axis to 2D shapes
- Q5. Write a program to apply translation and reflection to 2D shapes

### **Lab Sheet 2**

#### **Unit II:**

- Q1. Write a program to apply rotation to 2D shapes
- Q2. Write a program to apply X-shearing to 2D shapes
- Q3. Write a program to apply Y-shearing to 2D shapes
- Q4. Write a program to apply reflection along  $y=x$  line to 2D shapes
- Q5. Write a program to apply translation and shearing to 2D shapes

### **Lab Sheet 3**

#### **Unit II:**

- Q1. Write a program to apply reflection along  $y=-x$  line to 2D shapes
- Q2. Write a program to apply translation and rotation to 2D shapes
- Q3. Write a program to apply scaling and shearing to 2D shapes
- Q4. Write a program to apply scaling and translation to 2D shapes
- Q5. Write a program to apply scaling and reflection to 2D shapes

### **Lab Sheet 1**

#### **Unit III:**

- Q1. Write a program to apply composite scaling and rotation to 2-Dimensional shapes.
- Q2. Write a program to apply composite translation and rotation to 2-Dimensional shapes.
- Q3. Write a program to clip the lines fallen outside the window using Cohen Sutherland line clipping.

### **Lab Sheet 2**

#### **Unit III:**

- Q1. Write a program to apply scaling and rotation to 3-Dimensional shapes.
- Q2. Write a program to apply scaling and translation to 3-Dimensional shapes.
- Q3. Write a program to apply translation and rotation to 3-Dimensional shapes.

### **Lab Sheet 3**

#### **Unit III:**

- Q1. Write a program to apply composite scaling and rotation to 3-Dimensional shapes.
- Q2. Write a program to apply composite translation and rotation to 3-Dimensional shapes.
- Q3. Write a program to apply composite translation and scaling to 3-Dimensional shapes.

**Lab Sheet 1****Unit IV:**

- Q1. Write a program to implement line attributes.
- Q2. Write a program to implement circle attributes.
- Q3. Write a program to implement ellipse attributes.

**Lab Sheet 2****Unit IV:**

- Q1. Write a program to draw Bezier Curve.
- Q2. Write a program to draw Cubic Bezier Curve.

**Lab Sheet 3****Unit IV:**

- Q1. Write a program to draw Bezier surfaces.
- Q2. Write a program to generate fractal images.

**Textbooks**

1. Hearn and Baker "Computer Graphics" 2nd Edition, Pearson Education.
2. Fundamentals of Multimedia" by Ze-Nian Li and Mark S. Drew

**Reference Books**

1. W.M.Newman and Sproull. "Principles of interactive Computer Graphics" ,TMH
2. Steven Harrington." Computer Graphics a Programming Approach" McGraw Hill.
3. Plastock and Kelley. "Schaums outline of theory and problems of computer Graphics"
4. David F Rogers and J Alan Adams. "Procedural Elements of Computer Graphics" McGraw Hill
5. David F Rogers and J Alan Adams. "Mathematical Elements of Computer Graphics" McGraw Hill
6. James. D. Foley, A Van dam etal "Computer Graphics" Pearson.
7. Sinha and Udai , "Computer graphics", TMH

**COURSE OUTCOMES (CO):**

**CO1: Apply Graphics Principles:** Understand and apply core concepts of computer graphics and transformations.

**CO2: Implement Algorithms:** Develop and execute line drawing, clipping, and filling algorithms.

**CO3: Create Curves and Surfaces:** Design and manipulate graphical models using spline and Bezier techniques.

**CO4: Manage Multimedia:** Integrate and manage multimedia elements and file formats.

<b>COURSE TITLE: Wireless and Mobile Communication</b>							
<b>Course Code</b>			<b>: MCA21306DCE</b>			<b>Examination Scheme</b>	
<b>Total number of Lecture Hours: 48</b>					<b>External</b>	<b>80</b>	
					<b>Internal</b>	<b>20</b>	
<b>Lecture (L):</b>	<b>3</b>	<b>Practical(P):</b>	<b>0</b>	<b>Tutorial (T):</b>	<b>1</b>	<b>Total Credits</b>	<b>4</b>
<b>Course Objectives:</b>							
<ul style="list-style-type: none"> <li>• Learn the classification and types of wireless telephones including Cordless, Fixed Wireless (WLL), Wireless with limited mobility (WLL-M), and Fully Mobile Wireless phones.</li> <li>• Understand the concept of cells, sectorization, coverage area, frequency reuse, and cellular networks.</li> <li>• Learn the purpose and functionality of various channels such as Pilot, Sync, Paging, Forward Traffic Channels, Access Channels, and Reverse Traffic Channels.</li> <li>• Understand the GSM reference architecture and the components of mobile networks including Mobile Stations (MS), Base Transceiver Stations (BTS), Base Station Controllers (BSC), and Mobile Switching Centers (MSC).</li> <li>• Explore different handoff scenarios within the GSM network.</li> </ul>							
<b>Course Content</b>						<b>TEACHING HOURS</b>	
<b>UNIT 1:</b>						<b>12 Hrs</b>	
Classification and types of Wireless telephones. Introduction to Cordless, Fixed Wireless (WLL), Wireless with limited mobility (WLL-M) and (Fully)Mobile Wireless phones. Introduction to various generations of mobile phone technologies and future trends. Wireline vs. Wireless portion of mobile communication networks. Mobile-Originated vs. Mobile-Terminated calls. Mobile Phone numbers vs. Fixed-Phone numbers							
<b>UNIT 2:</b>						<b>12 Hrs</b>	
Concept of cells, sectorization, coverage area, frequency reuse, cellular networks & handoffs. Wireless Transmission concepts; types of antennas; concepts of signal propagation, blocking, reflection, scattering & multipath propagation. Comparison of multiple access techniques FDM, TDM and CDM. Concept of Spread Spectrum(SS) techniques; Frequency Hopping SS . Direct Sequence SS and concept of chip-							

sequence.	
<b>UNIT 3:</b>	<b>12 Hrs</b>
Concept of Forward and Reverse CDMA channel for a cell/sector. Concept/derivation of Walsh codes & Code Channels within a CDMA Channel. Simplified illustration of IS-95 CDMA using chip sequences. Purpose of Pilot, Sync, Paging, Forward Traffic Channels. Purpose of Access & Reverse TCs.	
<b>UNIT 4:</b>	<b>12 Hrs</b>
GSM reference architecture and components of Mobile Networks: MS, BTS, BSC, MSC; their basic functions and characteristics. Use of HLR and VLR in mobile networks. Handoff scenarios in GSM.	
<p><b>Tutorial</b></p> <p><b>Unit I</b></p> <p>Tutorial 1</p> <p>Q1. Describe the evolution of wireless and mobile communication technologies by writing concise notes on: (a) Fixed Wireless (b) Cordless Phones (c) WLL / WLL-M technologies (d) Fully-Mobile Wireless</p> <p>Q2. Name and briefly describe three technologies used by second-generation mobile networks and indicate the bandwidth of the channel used by each one.</p> <p>Q3. Explain the concept of a cell, coverage area and sectorization.</p> <p>Tutorial 2</p> <p>Q1 Draw a diagram showing the positioning of wireless networks vis – a - vis wired network.</p> <p>Q2 Why are wired +network usually part of the wireless infrastructure?</p> <p>Q3 Differentiate between Portability, nomadicity and mobility</p> <p>Tutorial 3</p> <p>Q1 Name three channel sounding techniques, Give the advantages and disadvantages of each.</p> <p>Q2 What are the three important radio propagation phenomena at high frequencies? Which of them is predominant indoors</p>	

## **Unit II**

### Tutorial 1

Q1. Using diagrams, explain the idea of Frequency Reuse in the context of AMPS and CDMA.

Q2. Using a diagram and text explain the concept of handoff/handover in mobile networks.

Q3. Write short notes on: (a) types of antennas; (b) concepts of signal propagation, blocking, reflection, scattering & multipath propagation.

### Tutorial 2

Q1 Name the two most popular techniques used in digital cellular modems and give one example standard that uses each of them

Q2 For a 64-QAM modem give the SNR at which the error rate over a telephone line is 10.

Q3 Why is PPM used with infrared communication instead of PAM?

### Tutorial 3

Q1 Name a cellular telephony standard that employs FDMA

Q2 What are the popular access schemes for data networks? Classify them.

Q3 Name two duplexing methods and one example standard that uses each of these technologies.

## **Unit III**

### Tutorial 1

Q1. Using diagrams and text explain the Concepts of Spread Spectrum(SS) techniques; Frequency Hopping SS & Direct Sequence SS.

Q2. Explain using diagrams the Concept of Forward and Reverse CDMA channel for a cell/sector.

Q3. Explain the Concept/Derivation of Walsh codes & Code Channels within a CDMA Channel.

### Tutorial 2

Q1 What is the difficulty of implementing CSMA/CD in a wireless environment

Q2 What is the capture effect and how does it impact the performance of the random access methods?

Q3 Name three standard using TDMA/TDD as their access method.

### Tutorial 3

Q1 Assume that you have a six sector cells in a hexagonal geometry. Draw the hexagonal grid corresponding to this case, Compute S, for reuse factors of 7,4 and 3. Comment on your results

Q2 Compare peer to peer and multihop ad hoc topologies



**Unit IV**

## Tutorial 1

Q1. Explain the Purpose of Pilot, Sync, Paging, Forward Traffic Channels in CDMA networks.

Q2. Using diagrams and text explain briefly GSM reference architecture and components of Mobile Networks: MS, BSC, NSS; their subsystem functions and characteristics.

Q3. Draw diagrams with associated text to explain various Handoff Scenarios supported in GSM.

## Tutorial 2

Q1 Give three reasons why it is difficult to detect collisions at the transmitter in wireless networks.

Q2 What are the new elements added to the GSM infrastructure to support GPRS?

Q3 What are the new elements added to the AMPS infrastructure to support CDPD?

## Tutorial 3

Q1 Draw the protocol stack of CDPD to the M-ES at the MDMS and at the ND-IS. Show the communication between different peer layers.

Q2 Of the design goals of CDPD which three do you consider important? Why?

Q3 Explain with diagram MTP, PTP ?

**Textbooks**

3. K.Pahlavan, P.Krishnamurthy, "Principles of Wireless Networks", PHI.

**Reference Books**

8. T. Rappaport, "Wireless Communications, Principles and Practice(2nd Edition)", Pearson.

9. 2. Dornan, "The Essential Guide to Wireless Communications Applications", Pearson.

10. Jochen Schiller, "Mobile Communications", Pearson.

**COURSE OUTCOMES (CO):**

**CO1:** Students will be able to classify and describe different types of wireless telephones and their uses.

**CO2:** Students will gain insights into the evolution of mobile technologies and the differences between various network types and call scenarios.

**CO3:** Students will understand and explain key concepts in cellular networks including cell structure, sectorization, and handoffs.

**CO4:** Students will be able to describe and derive the functionality of Forward and Reverse CDMA channels.

**CO5 :** Students will understand and apply Walsh codes, chip sequences, and the different CDMA channel types within a network.

<b>COURSE TITLE: Database Systems</b>							
<b>Course Code:</b>		<b>MCA21102CR</b>			<b>Examination Scheme</b>		
<b>Total number of Lecture Hours: 48</b>					<b>External</b>	<b>80</b>	
					<b>Internal</b>	<b>20</b>	
<b>Lecture (L):</b>	<b>3</b>	<b>Practicals(P):</b>	<b>2</b>	<b>Tutorial (T):</b>	<b>0</b>	<b>Total Credits</b>	<b>4</b>
<b>Course Objectives</b>							
<ul style="list-style-type: none"> <li>• Grasp the basic concepts of data, information, and knowledge, and the need for and evolution of databases and DBMS. Analyze the characteristics, advantages, and disadvantages of the DBMS approach.</li> <li>• Describe data models, schemas, and instances, and compare various database models. Understand the Three Schema Architecture, data independence, database languages, interfaces, and DBMS classifications.</li> <li>• Gain an overview of data modeling and create entity-relationship (ER) models to represent data structures and relationships effectively.</li> <li>• Understand the basic concepts, characteristics, and constraints of the relational data model. Apply relational algebra operations, including unary, set theory, and binary operations, to manipulate relational data.</li> <li>• Apply the criteria for good database design. Use functional dependencies and normalization techniques (1NF, 2NF, 3NF, BCNF) to design efficient and reliable database schemas that ensure data integrity and minimize redundancy.</li> <li>• Learn SQL syntax and functionalities, including data definition, manipulation, and transaction control. Handle constraints, joins, views, synonyms, indexes, subqueries, and locks in SQL. Understand the basics of transaction processing, concurrency control, schedules, serializability, and recovery mechanisms to ensure database consistency and reliability.</li> </ul>							
<b>Course Content</b>						<b>TEACHING HOURS</b>	

<b>UNIT 1: Introduction to Database Systems</b>	<b>12 Hrs</b>
<p>Introduction to Data, Information and Knowledge. Database basics – Need and evolution, Database and DBMS. Characteristics of Database Approach, Advantages and disadvantages of DBMS Approach.</p> <p>Database System Concepts and Architecture – Data Models, Schemas, and Instances, Database Models and Comparison Three Schema Architecture and Data Independence. Database Languages and Interfaces. DBMS architectures. DBMS Classification.</p> <p>Data Modeling: Overview of Data Modeling, Entity-Relationship (ER) Modeling.</p>	
<b>UNIT 2: Relational Data Model and Database Design</b>	<b>12 Hrs</b>
<p>Relational Data Model – Basic Concepts and Characteristics, Model Notation, Model Constraints and Database Schemas, Constraint Violations</p> <p>Relational Algebra – basic concepts, Unary Relational Operations, Algebra Operations from Set Theory, Binary Operations, Additional Relational Operations</p> <p>Criterion for Good Database Design. Database Design through Functional Dependencies &amp; Normalization: Functional Dependencies, Lossless Join, Normal Forms: 1NF, 2NF, 3NF, BCNF.</p>	
<b>UNIT 3: SQL and Advanced Data Definition</b>	<b>12 Hrs</b>
<p>Introduction to SQL, Data Types, Data Definition Language, Data Manipulation Language, Specifying Constraints in SQL, Transaction Control Language, SQL Functions, Set Operators and Joins, View, Synonym and Index, Sub Queries and Database Objects, Locks and SQL Formatting Commands.</p>	
<b>UNIT 4: Transaction Processing and Database Recovery</b>	<b>12 Hrs</b>

Transaction Processing –Transaction Processing Basics, Concurrency Control, Transaction and Systems Concepts, Desirable properties of Transactions.

Characterizing Schedules and Recoverability, Schedules and Serializability.  
Concurrency Control - TwoPhase Locking, Timestamp Ordering.

Database Recovery – Concepts, Transaction Rollback, Recovery based on Deferred and Immediate Update, Shadow Paging

### **Lab Manual**

#### **UNIT I**

##### **Lab #1**

List various users, functions and constraints of the database system for Library Management. b. List various users, functions and constraints of the database system for Banking System.

##### **Lab #2**

a. Identify the various tables and draw a diagrammatic schema to represent the database of Library management system. b. Identify the various tables and draw a diagrammatic schema to represent the database of University system.

##### **Lab #3**

- Draw ER Model for the database of Library management system. b. Draw ER Model for the database of University management system.

#### **UNIT II**

### Lab #1

Consider the following schema: Suppliers (sid, sname, address) Parts (pid, pname, color) Catalog (sid, pid, cost) Write relational algebra queries to

- Find the name of suppliers who supply some red parts.
- Find the sids of suppliers who supply some red or green parts
- Find the sids of suppliers who supply some red part or are at Srinagar.
- Find the sids of suppliers who supply some red and some green part.
  - Find the sids of suppliers who supply every part.
  - Find the sids of suppliers who supply every red part.
- Find the sids of suppliers who supply every red or green part.

### Lab #2

a. Consider a schema  $R(A,B,C,D)$  and functional dependencies  $A \rightarrow B$  and  $C \rightarrow D$ . Check the decomposition of  $R$  into  $R_1(AB)$  and  $R_2(CD)$  for lossless join and dependency preservation.

b.  $R(A,B,C,D)$  is a relation. Which of the following does not have a lossless join, dependency preserving BCNF decomposition?

1.  $A \rightarrow B, B \rightarrow CD$

2.  $A \rightarrow B, B \rightarrow C, C \rightarrow D$

3.  $AB \rightarrow C, C \rightarrow AD$

4.  $A \rightarrow BCD$

### Lab #3

- Using a sample schema and data, demonstrate the use of 1NF, 2NF, 3NF and BCNF

## UNIT III

### Lab #1

- Create table Student with following attributes and perform the following operations? i.

Attribute Name	ST_ROLLNO	ST_NAME	ST_ADDRESS	ST_TELNO
Date Type	Number	Varchar	Char	Varchar2
Size	6	30	35	15

- AddnewattributesCity,Street,CountrywithDatatypeVarcharandlength30?
  - Modifyfield ST\_ROLLNOand change thesize to5?
    - RemovecolumnST\_ADDRESS?
    - DescribetheTableStudent?
    - DropTableStudent?
  - CopyStructureof onetableto another
- Create Users user1, user2,user3 and perform the following operations
  - Grant Session Privilege to the newly created users?
  - Grant privileges for creating and manipulation tables?
  - Grant data manipulation privileges to various users on tables?
    - Grant privileges with grant option.
    - Revoke privileges.

### Lab #2

- a. Create Object ADDRESS and use the object in a Table DDL?
- b. Create table Student with following attributes and perform the following operations.

Attribute Name	ST_ROLLNO	ST_NAME	ST_STREET	ST_CITY	ST_State	ST_Country	DTE_REG
DateType	Number	Varchar	Char	Char	Varchar2	Varchar2	Date
Size	6	30	35	30	30	30	

- Insert 10recordsinthetable.
- PerformvariousProjectOperationsusingSelectQuery.
- PerformvariousrestrictoperationsusingSelectQuery.
  - Updaterecords inthetable.
  - Deleterecordsinthetable.
- Create another table with same structure as existing table without copying the data.

- Create another table along with the structure and data from existing table.

### Lab #3

a. Create table Student with ST\_ADDRESS as Object Type with following attributes and

Attribute Name	ST_ROLL NO	ST_NAME	ST_ADDRESS				DT_REG
			ST_STREET	ST_CITY	ST_State	ST_Country	
Date Type	Number	Varchar	Char	Char	Varchar 2	Varchar 2	Date
Size	6	30	35	30	30	30	

- Insert 10 records.
- Perform various Project Operations using Select Query.
- Perform various restrict operations using Select Query.
  - Update records in the table
  - Delete records in the table

b. Create table STUDENT with following attributes and perform the following operations?

Attribute Name	ST_ROLL NO	ST_NAME	ST_STREET	ST_CITY	ST_State	ST_Country	DTE_REG
Date Type	Number	Varchar	Char	Char	Varchar 2	Varchar 2	Date
Size	6	30	35	30	30	30	

- Insert 10 records in the table.
- Perform various Project Operations using Select Query.
- Perform various restrict operations using Select Query using various arithmetic and Logical Operators like
  - Less Than
  - Greater Than
  - Less Than or Equal to
  - Greater Than or Equal To
    - Equal to
    - Not Equal To
- Perform restrict operations using various datatypes like

numeric,Characters,Date.

- Perform Update operations using various Arithmetic and Logical Operators on Table STUDENT
- Perform Delete operations using various Arithmetic and Logical Operators on Table STUDENT
- Use Insert and Select Commands together with Arithmetic and Logical Operators.

## UNIT IV

### Lab #1

- Perform following Transaction Control Operations on the above table
  - Perform various data manipulation operations the table .
    - Create Five Savepoints from S1 to S5.
    - Rollback to Various savepoints and observe the changes in the table.
  - Perform various DDL operations the table and observe its effect on Savepoint and Rollback on the table.
  - Try to abnormally terminate the application to observe whether data is saved or not.
  - Use Commit and Commit Work commands to save the data permanently.
- Create table STUDENT with following attributes and perform various DML operations to verify domain constraint

Attribute Name	ST_ROLLNO	ST_NAME	ST_ADDRESS
Date Type	Number	Varchar2	Varchar
Size	6	30	35
Constraint	NOTNull	NotNULL	NOTNULL

### Lab #2

- Create table STUDENT with following attributes and perform various DML operations to verify Validity Integrity.

Attribute Name	ST_ROLLNO	ST_NAME	ST_ADDRESS
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<b>Attribute Name</b>	ST_ROLLNO	ST_NAME	ST_ADDRSS
<b>Date Type</b>	Number	Varchar2	Varchar
<b>Size</b>	6	30	35
<b>Constraint</b>	Primary/UniqueKeys	NotNULL	NOTNULL
<b>Date Type</b>	Number	Varchar2	Varchar
<b>Size</b>	6	30	35
<b>Constraint</b>	CHECK(ROLLNO >20001 and ROLLNO <30001)	NotNULL	NOTNULL

- b. Create table STUDENT with following attributes and perform various DML operations to verify Entity Integrity using Primary and Unique Keys?

### Lab #3

- a. Create table STUDENT with following attributes and perform various DML operations to verify Referential Integrity using given tables (employee and department)?

<b>Attribute Name</b>	EMP_ID	EMP_NAME	ST_ADDRESS	DEPT_ID
<b>Date Type</b>	Number	Varchar2	Varchar	Number
<b>Size</b>	6	30	35	4
<b>Constraint</b>	PrimaryKey	NotNULL	NOTNULL	Foreign Key

<b>Attribute Name</b>	DID	NAME	Address
<b>Date Type</b>	Number	Varchar2	Varchar
<b>Size</b>	4	30	100
<b>Constraint</b>	Primary Key	NotNULL	NOTNULL

b. Write SQL queries to demonstrate use of Join and various SQL functions

**Textbooks**

1. Elmasri and Navathe, Fundamentals of Database Systems, 7/e, Pearson, 2016

**Reference Books**

1. Silberschatz, Korth, & Sudarshan, Database System Concepts, McGraw-Hill, 7/e, 2011.
2. Bayross I. SQL, PL/SQL: The Programming Language of Oracle, BPB Publications, 2009
3. Michael J. Hernandez ,Database Design for Mere Mortals®: A Hands-on Guide to RelationalDatabase Design, Third Edition, Addison-Wesley Professional, 2013

**COURSE OUTCOMES (CO):**

**CO1:** Demonstrate the ability to understand the fundamentals of data, information, and knowledge. Evaluate the need, evolution, and characteristics of databases and DBMS, including their advantages and disadvantages.

**CO2:** Describe and apply various database system concepts and architectures, including data models, schemas, instances, and the Three Schema Architecture. Understand and use database languages, interfaces, and DBMS classifications.

**CO3:** Create effective data models using entity-relationship (ER) modeling. Apply relational data model principles and relational algebra operations. Design and normalize database schemas using functional dependencies and various normal forms (1NF, 2NF, 3NF, BCNF).

**CO4:** Utilize SQL for defining, manipulating, and controlling data. Handle constraints, joins, views, subqueries, and database objects. Understand and apply transaction processing concepts, concurrency control mechanisms, and database recovery techniques to ensure database consistency and reliability.

<b>COURSE TITLE: Artificial Intelligence</b>							
<b>Course Code: MCA21203CR</b>				<b>Examination Scheme</b>			
<b>Total number of Lecture Hours:</b>				<b>External</b>		<b>80</b>	
				<b>Internal</b>		<b>20</b>	
<b>Lecture (L):</b>	<b>3</b>	<b>Practicals(P):</b>	<b>2</b>	<b>Tutorial (T):</b>	<b>0</b>	<b>Total Credits</b>	<b>4</b>
<b>Course Objectives</b>							
<ul style="list-style-type: none"> <li>• To present an overview of artificial intelligence (AI) principles and approaches .</li> <li>• To develop a basic understanding of the building blocks of AI as presented in terms of Knowledge representation, inference, logic, and learning.</li> <li>• To have understating of different search problems and their solution using various algorithms</li> <li>• To have basic understanding of role of AI and ML along with IOT, expert systems</li> </ul>							
<b>Course Content</b>						<b>TEACHING HOURS</b>	
<b>UNIT 1:</b>						<b>10-Hrs</b>	
Introduction and historical perspective, Turing Test. Expert Systems, Forward chaining, backward chaining, Conflict Resolution. Agents: Intelligent agents, Agents and Environment, Structure of Agents Knowledge Representation: Propositional Logic, First Order Logic, Inference in First Order Logic, Prepositional Versus First Order Logic							

<b>UNIT 2:</b>	<b>10-Hrs</b>
Fuzzy Logic, Fuzzification, Fuzzy Sets, Operations on Fuzzy Sets, Hedges, Reasoning in Fuzzy Logic. Mamdani Inference Search Algorithms – Local search algorithms: Gradient ascent, Simulated Annealing, Genetic Algorithm.	
<b>UNIT 3:</b>	<b>10-Hrs</b>
Inductive Learning: Inductive learning algorithms. Categories of inductive learning algorithms. Rule extraction with inductive learning algorithms, Decision trees, ID3 algorithm. AQ algorithm, SAFARI algorithm Applications of Inductive Learning Machine Learning: Supervised, Unsupervised and Reinforcement Learning	
<b>UNIT 4:</b>	<b>10 Hrs</b>
Neural Networks: Neuron as a basic building element of an ANN. Activation functions, Perceptron. Learning with a perceptron. Limitations of a perceptron. Multilayer Neural Networks, Training by Error Back Propagation Self Organising Nets, Kohonen Self-Organising Net Convolutional Neural Networks	
<b>Lab Manual</b> <b>Unit I</b> <b>Lab Sheet 1</b> 1. Build an expert system and demonstrate forward chaining inferencing. <b>Lab Sheet 2</b> 1. Build an expert system and demonstrate backward chaining inferencing. <b>Lab Sheet 3</b> 1. Build an expert system and demonstrate conflict resolution process. <b>Unit II</b> <b>Lab Sheet 1</b> 1. Build a Fuzzy inference system for the Tipping Problem <b>Lab Sheet 2</b> 1. Using Fuzzy Logic solve the following Tipping problem: Given two sets of numbers	

between 0 and 5 (where 0 is for very poor, and 5 for excellent) that respectively represent quality of service and quality of food at restaurant, what should tip be?

**Lab Sheet 3**

1. Solve 2-input 1-output project risk prediction problem using Mamdani Inference. Make necessary assumptions.

**Unit III**

**Lab Sheet 1**

1. Create a decision tree for a given dataset using ID3 algorithm

**Lab Sheet 2**

1. Implement Classification and Regression Tree (CART) algorithm for any relevant dataset.

**Lab Sheet 3**

1. Demonstrate inductive learning on any application of your choice.

**Unit IV**

**Lab Sheet 1**

1. Implement single layer perceptron.

**Lab Sheet 2**

- 1 Demonstrate Neural Networks using different activation functions

**Lab Sheet 3**

1. Implement Back-propagation Algorithm

**Textbooks**

Artificial Intelligence – A Modern Approach, Stuart Russel, Peter Norvig, PHI/Pearson Education.

**Reference Books**

1. Machine Learning by Tom M. Mitchel, McGraw-Hill publication
2. Introduction to Machine Learning by EthemAlpaydin, The MIT Press.
3. Artificial Intelligence and Expert Systems by Patterson PHI
4. Advances in Deep Learning by M. Arif Wani, Springer

**COURSE OUTCOMES (CO):**

*Four to Six course outcomes to be listed by the course instructor*

**CO1:** Apply AI techniques to solve problems of Game Playing, Expert Systems, Machine Learning.

**CO2:** Formulate an efficient problem space for problem solving and Represent knowledge using the appropriate technique.

**CO3:** Design and develop expert systems to solve uncertainty problems.

**CO4:** Analyze real world problems and implement the concepts of AI in different domains

<b>COURSE TITLE: Python</b>							
<b>Course Code: MCA21202CR</b>				<b>Examination Scheme</b>			
<b>Total number of Lab Hours:</b>				<b>External</b>		<b>40</b>	
				<b>Internal</b>		<b>10</b>	
<b>Lecture (L):</b>	<b>1</b>	<b>Practicals(P):</b>	<b>2</b>	<b>Tutorial (T):</b>	<b>-</b>	<b>Total Credits</b>	<b>2</b>
<p><b>Course Objectives:</b></p> <ul style="list-style-type: none"> <li>• Develop Proficiency in Python Programming: Equip students with fundamental programming skills in Python, focusing on syntax, control structures, data types, and basic operations.</li> <li>• Apply Advanced Python Concepts to Real-World Problems: Enable students to use advanced Python features, including object-oriented programming, data analysis libraries, and web scraping techniques, to solve practical problems.</li> <li>• Enhance Problem-Solving and Analytical Skills: Strengthen students' abilities to think logically and analytically by solving programming challenges and developing projects that require the application of Python in various contexts.</li> </ul>							
<b>Course Content</b>						<b>TEACHING HOURS</b>	
<b>Unit I:</b>						<b>12 Hrs</b>	
Understanding Python variables, Python basic Operators, python blocks , Data Types, Declaring and using Numeric data types: int, float, complex Using string data type and string operations Defining list and list slicing Use of Tuple data type: Python Program Flow Control Conditional blocks using if, else and elif Simple for loops in python, For loop using ranges String, list and dictionaries Use of while loops in python Loop manipulation using pass, continue, break and else Programming using Python conditional and loops block							
<b>Unit II:</b>						<b>12 Hrs</b>	

Python Functions, Modules And Packages, Organizing python codes using functions Organizing python projects into modules, Importing own module as well as external modules Understanding Packages Powerful Lamda function in python, Programming using functions, modules and external packages, Python String, List And Dictionary Manipulations.	
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**Lab Manual**

• **Week 1**

1. Install Python and set up IDEs like Jupyter Notebook or VS Code
2. Write a "Hello, World!" program.
3. Write a program to perform basic arithmetic operations: addition, subtraction, multiplication, and division.
4. Write a program to print your name and age.

• **Week 2**

1. Write a program to create variables of different data types (int, float, complex, string) and print their values.
2. Write a program to perform string operations: concatenation, slicing, and repetition.
3. Write a program to demonstrate arithmetic, logical, and relational operations.

• **Week 3**

1. Write a program to create a list, perform slicing, and append elements to it.
2. Write a program to demonstrate the use of tuple data type and its operations.
3. Write a program to find the length, maximum and minimum value of a list.

• **Week 4**

1. Write a program to demonstrate the use of if, else, and elif statements.
2. Write a program to print the first 10 natural numbers using a for loop.
3. Write a program to print a pattern using nested loops (e.g., a pyramid).

- **Week 5**

1. Write a program to iterate over a string, list, and dictionary using loops.
  2. Write a program to demonstrate the use of while loops.
3. Write a program to manipulate loops using pass, continue, break, and else.

- **Week 6**

1. Write a program to read a user's name and print a greeting message.
  2. Write a program to read from and write to a text file.
3. Write a program to take multiple inputs from the user and print them.

- **Week 7**

1. Write a program to define and call a function that adds two numbers.
  2. Write a program to demonstrate the use of lambda functions.
3. Write a program with a function that takes a list as an argument and returns the sum of all its elements.

- **Week 8**

1. Write a program to create and import a custom module.
2. Write a program to use an external library (e.g., math or random).
  3. Write a program to organize code into a package.

- **Week 9**

1. Write a program to define a class and create objects.



2. Write a program to demonstrate inheritance.
3. Write a program to show polymorphism using method overriding.

- **Week 10**

1. Write a program to read and write to a file using different modes.
2. Write a program to handle exceptions using try, except, and finally blocks.
3. Write a program to create a directory, write a file in it, and handle any exceptions that occur.

- **Week 11**

1. Write a program to find all occurrences of a pattern in a string using regular expressions.
2. Write a program to validate an email address using regular expressions.
3. Write a program to replace all instances of a substring in a string using regular expressions.

- **Week 12**

1. Write a program to connect to a MySQL database.
2. Write a program to perform basic CRUD operations in a MySQL database.
3. Write a program to retrieve and display data from a database.

- **Week 13**

1. Write a program to perform basic array operations using NumPy.
2. Write a program to create and manipulate DataFrame objects using Pandas.
3. Write a program to plot a simple graph using Matplotlib.
4. Write a program to perform a basic statistical analysis using SciPy.

**Textbook:** Kenneth A. Lambert, The Fundamentals of Python: First Programs, Cengage Learning, ISBN: 978-1111822705.

**Reference Books:**

1. David Beazley , Brian K. Jones “Python Cookbook”, 3rd Edition. O’Reilly Publications
2. Jake VanderPlas “Python Data Science Handbook” O’Reilly Publications
3. David Beazley, “Python Essential Reference (4th Edition) “ Addison Wesley
4. Vernon L. Ceder,” The Quick Python Book, Second Edition”, Manning Publications
5. Brett Slatkin ,”Effective Python”

**COURSE OUTCOMES (CO):**

- CO1:** Students will be able to write, debug, and execute Python programs, effectively using functions, data structures, and file handling operations.
- CO2:** Students will design and implement a project that integrates various Python concepts, demonstrating their ability to apply their knowledge to real-world applications.
- CO3:** Students will exhibit strong problem-solving skills, utilizing Python to tackle complex challenges and develop efficient, effective solutions.

<b>COURSE TITLE: Web Programming</b>						
<b>Course Code: MCA21205DCE</b>					<b>Examination Scheme</b>	
<b>Total number of Lecture Hours: 48</b>					<b>External</b>	<b>80</b>
					<b>Internal</b>	<b>20</b>
<b>Lecture (L):</b>	<b>3</b>	<b>Practicals(P):</b>	<b>2</b>	<b>Tutorial (T):</b>		<b>Total Credits</b>
						<b>4</b>

**Course Objectives:**

- Gain a comprehensive understanding of fundamental web technologies, including HTML, XHTML, and CSS.
- Learn the principles of responsive and accessible web design using CSS and various layout techniques.
  - Develop proficiency in JavaScript programming for client-side web development, including DOM manipulation and event handling.
  - Acquire skills in server-side scripting using PHP to create dynamic and interactive web applications.
- Understand how to integrate and manage databases within web applications using MySQL.
  - Combine client-side and server-side technologies to build complete, functional web applications.

<b>Course Content</b>	<b>TEACHING HOURS</b>
<b>UNIT 1:</b>	<b>-Hrs</b>
Adobe Photoshop Environment, Interface tour of Photoshop and Palettes, Color Modes and Resolutions, Using different Photoshop tools.  Working with Layers Grouping and Smart objects, Image Adjustments, Layer Masking and Layer Clipping, Using Blending Options, Filters, Photoshop actions, Animation tools  Markup Language, Basic Structure of HTML , Meta Tags, Document Structure Tags, Formatting Tags, Text Level formatting, Block Level formatting, List Tags, Hyperlink tags, Image and Image maps, Table tags, Form Tags, Executable content tags, Tables as a design tool, Forms, Creating Forms.	12
<b>UNIT 2:</b>	<b>- Hrs</b>

<p>Style Sheets: Different approaches to style sheets, Using Multiple approaches, Linking to style information in s separate file, Setting up style information.</p> <p>Java Script: JavaScript Objects, JavaScript Security, Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, Logical Operators, String Operators, Special Operators, ? (Conditional operator), ,(Comma operator), delete, new, this, void Statements : Break, comment, continue, delete, do ... while, export, for, for...in, function, if...else, import, labelled, return, switch, var, while, with, Core JavaScript (Properties and Methods of Each) : Array, Boolean, Date, Function, Math, Number, Object, String, regExp Document Object Model, Events and Event Handlers.</p>	12
<b>UNIT 3:</b>	<b>-Hrs</b>
<p>PHP, Server-side web scripting, Installing PHP, Adding PHP to How PHP scripts work, Basic PHP syntax PHP data types, PHP Variables, Operators in PHP, Conditional Statements, Loops (If, If else and Switch)</p> <p>Strings, Arrays and Array Functions, Numbers, PHP Function: User-Defined Functions, Inbuilt functions, Basic PHP errors / problems, Working with Forms, designing a Form, \$_GET and \$_POST, HTML and PHP code, User Input, Form Validation, Cookies, File uploading, Sessions</p>	12
<b>UNIT 4:</b>	<b>-Hrs</b>
<p>Advanced PHP and MySQL: PHP MySQL Integration, Creating a database connection, Selecting the DB, Basics of SQL, SQL Syntax, CRUD Operations, Inserting data in database, Inserting data with a File Retrieving data from Database, Retrieving data with specific criteria, Updating records, Searching the records, Alter table structure, Deleting the records Dropping tables. Emailing with PHP.</p>	12
<p><b>Lab Manual</b>  <b>Unit I</b>  <b>Week 1:</b></p>	
<ol style="list-style-type: none"> <li>1. Open any picture and make use of rectangular and elliptical selection tools to select portions of the image and paste it in another image. Also make use of move tools.</li> <li>2. Make use of the Lasso- and Polygonal Lasso Selection Tools, Copy, Paste Into, Move Tool, Zoom Tool, Quick Select Tool (or Magic Wand Tool), Invert Selection, Copy, Paste Transform</li> </ol>	

tools for editing an image.

3. Edit any image using the following tools, Paint Bucket Tool, Color Picker, Brush Tool.
4. Select an image and make use of Text Tool, Selection Tools, Copy, Paste, Transform, Move Tool, Opacity, Eraser Tool to perform different operations
5. Select any image of your choice and make use of the Brush Tool, Smudge Tool, Dodge Tool, Burn Tool, Layer Styles, Modes, The Shape Tools, the Styles palette.

#### **Week 2**

1. Applying different filters on an image and make use of different layers.
2. Create a page banner from scratch using browser-safe colors
3. Make the illusion of an image fitting inside your text using clipping mask.
4. Create an Animation for Rocket Launch and Moving Ball

#### **Week 3**

1. Create a html page with demonstrates the use of formatting tags image tags and other basic tags.
2. Create the different types of list, tables in html
3. Create a table with the relevant tags and attributes
4. Create a html form in the table layout covering major form elements

#### **Unit II**

#### **Week 4**

1. Link an external style sheet with styles for basic tags.
2. Create a CSS code for applying design on the webpage.
3. Using a DIV tag and CSS code design a web page.
4. Create a CSS code and use id and Class identifiers.

#### **Week 5**

1. Write a JavaScript program to sum the multiples of 3 and 5 under 1000?
2. Write a JavaScript Code for checking type of triangle where three sides are given.
3. Write a JavaScript code to convert a Decimal Number int Roman Number?
4. Write a JavaScript function to test whether a string ends with a specified string

#### **Week 6**

1. Write a JavaScript to check whether a given string is palindrome or not.
2. Write a program using Java Script that checks if two matrices have identical values in all the elements
3. Write a JavaScript program to check a credit card number and validate an email address using JavaScript Regular Expressions?
5. Write a JavaScript program to implement DOM?

#### **Unit -III**

### **Week 7**

1. Create a simple HTML form and accept the user name and display the name through PHP echo statement
2. Write a PHP program to remove duplicates from a sorted list.
3. Write a PHP program to compute the sum of the prime numbers less than 100
4. Write a PHP program to print out the sum of pairs of numbers of a given sorted array of positive integers which is equal to a given number?

### **Week 8**

1. Write a program to calculate and print the factorial of a number using a for loop.
2. Write a PHP script using nested for loop that creates a chess board?
3. Write a program that inputs a number from the user and display all armstrong numbers upto the number entered using loops?
4. Write a function to reverse a string.

### **Week 9**

1. Write a PHP code to Validate and form and provide results on the other web page
2. Write a PHP code to implement various string functions used in PHP.
3. Write a PHP code for uploading a file in a specific folder on the server.
4. Write a PHP code so sort an array using any sorting technique?

### **Week 10**

1. Write a PHP script to get time difference in days and years, months, days, hours, minutes, seconds between two dates
2. Write a PHP function to get start and end date of a week (by week number) of a particular year
3. Write a PHP script to generate random 11 characters string of letters and numbers
4. Write a PHP function to create a human-readable random string for a captcha.

## **Unit - IV**

### **Week 11**

1. Write the mysql code to create the database represented by following E-R diagram . Keep all the referential integrity constraints into consideration?
2. Insert the dummy data inside the tables making any assumptions as required if any ?
3. Write a SQL statement to insert records into the table countries to ensure that the country\_id column will not contain any duplicate data and this will be automatically incremented and the column country\_name will be filled up by 'N/A' if no value assigned for that column.
4. Write a SQL statement to insert rows in the job\_history table in which one column job\_id is containing those values which are exists in job\_id column of jobs table.
5. Write a SQL statement to insert rows into the table employees in which a set of columns department\_id and manager\_id contains a unique value and that combined values must have

exists  
into the table departments.

6. Write a SQL statement to insert rows into the table employees in which a set of columns department\_id and job\_id contains the values which must have exists into the table departments and jobs.

**Week 12**

1. Write a query to display the name (first\_name, last\_name) and salary for all employees whose salary is not in the range \$10,000 through \$15,000.
2. Write a query to display the name (first\_name, last\_name) and salary for all employees whose salary is not in the range \$10,000 through \$15,000 and are in department 30 or 100.
3. Write a query to display the first\_name of all employees who have both "b" and "c" in their first name.
4. Write a query to get the total salaries payable to employees.
5. Write a query to get the minimum salary from employees table.
6. Write a query to get the maximum salary of an employee working as a Programmer.
7. Write a query to get the average salary and number of employees working the department 90.
8. Write a query to find the name (first\_name, last\_name) and hire date of the employees who was hired after 'Jones'.
9. Write a query to get the department name and number of employees in the department
10. Write a query to find the employee ID, job title, number of days between ending date and starting date for all jobs in department 90.
11. Write a query to display the department ID and name and first name of manager.
12. Write a query to display the department name, manager name, and city.
13. Write a query to display the job title and average salary of employees.
14. Write a query to display job title, employee name, and the difference between salary of the employee and minimum salary for the job
15. Write a query to get the DATE value from a given day (number in N).
16. Write a query to get the firstname, lastname who joined in the month of June.
17. Write a query to get the years in which more than 10 employees joined.
18. Write a query to get first name of employees who joined in 1987.
19. Write a query to get department name, manager name, and salary of the manager for all managers whose experience is more than 5 years.
20. Write a query to get employee ID, last name, and date of first salary of the employees.
21. Write a query to get first name, hire date and experience of the employees

22. Write a query to get the department ID, year, and number of employees joined.
23. Write a query to update the portion of the phone\_number in the employees table, within the phone number the substring '124' will be replaced by '999'.
24. Write a query to get the details of the employees where the length of the first name greater than  
than  
or equal to 8.
25. Write a query to display the first word from those job titles which contains more than one words
29. Write a query to display the first eight characters of the employees' first names and indicates the amounts of their salaries with '\$' sign. Each '\$' sign signifies a thousand dollars. Sort the data in descending order of salary.
26. Write a query to display the employees with their code, first name, last name and hire date who  
hired either on seventh day of any month or seventh month in any year
- Week 13.**
1. Create a PHP-MySQL connection which connects to the hr database using PHP objects ?
  2. Create a form to add using sign in and sign out, update and delete employee to the hr database?
  3. Create a login, logout for every employee and list all the employee in the database?
  4. Write a php script which emails the login details to the new employee along with his salary details fetch from the hr database?
  5. Write a php script which demonstrates the use of sessions and cookies which inserting in the database?

**Textbooks**

1. Learning PHP, MySQL & JavaScript by Robin Nixon, O'Reilly Media.
2. JavaScript and JQuery: Interactive Front-End Web Development by Jon Ducket

**Reference Books**

1. Web Design The complete Reference, Thomas Powell, Tata McGrawHill
2. HTML and XHTML The complete Reference, Thomas Powell, Tata McGrawHill
3. JavaScript 2.0 : The Complete Reference, Second Edition by Thomas Powell and Fritz Schneider
4. PHP: The Complete Reference By Steven Holzner, Tata McGrawHill

**COURSE OUTCOMES (CO):**



<p><b>CO1: HTML and XHTML Proficiency:</b> Students will be able to create well-structured HTML and XHTML documents, utilizing semantic elements and multimedia integration.</p> <p><b>CO2: CSS Styling and Layout:</b> Students will demonstrate the ability to apply CSS for styling web pages, including advanced techniques like Flexbox and Grid layouts.</p> <p><b>CO3: JavaScript Development:</b> Students will be able to write JavaScript code to handle user interactions, manipulate the DOM, and implement AJAX for asynchronous data fetching.</p> <p><b>CO4: PHP and Form Handling:</b> Students will be proficient in writing PHP scripts for server-side processing, form handling, and user input validation.</p> <p><b>CO5: Database Operations:</b> Students will be able to connect web applications to MySQL databases, perform CRUD operations, and manage data securely.</p> <p><b>CO6: Complete Web Application Development:</b> Students will be capable of developing and deploying full-stack web applications that integrate HTML, CSS, JavaScript, PHP, and MySQL.</p>

<b>Machine Learning</b>							
<b>Course Code:</b>			<b>MCA21304CR</b>			<b>Examination Scheme</b>	
<b>Total number of Lecture Hours:24 Hrs</b>						<b>External</b>	<b>40</b>
						<b>Internal</b>	<b>10</b>
<b>Lecture (L):2</b>	-	<b>Practicals(P):</b>	-	<b>Tutorial (T):</b>	-	<b>Total Credits</b>	<b>2</b>
<b>Course Objectives</b>							
<ul style="list-style-type: none"> <li>• <i>To present an overview of Machine Learning(ML) principles and approaches .</i></li> <li>• <i>To understand pattern clustering and classification algorithms to classify data</i></li> <li>• <i>To understand the Implementation of Support Vector Machine algorithm</i></li> </ul>							

<ul style="list-style-type: none"> <li>• <i>To create new machine learning techniques.</i></li> </ul>	
<b>Course Content</b>	<b>TEACHING HOURS</b>
<b>UNIT 1:</b>	<b>12-Hrs</b>
<p>Linear regression, Classification Algorithms: KNN and effect of various distance measures (Euclidean, Manhattan, Mahalanobis Distances, etc.) Clustering Algorithms: Fuzzy C-means, Hierarchical clustering, Density-based spatial clustering of applications with noise (DBSCAN) Cluster Validity index. Compactness Cluster Measure, Distinctness Cluster Measure, Validity Index Using Standard Deviation, Point Density Based Validity Index, Validity index using Local and Global Data Spread,</p>	
<b>UNIT 2:</b>	<b>12Hrs</b>
<p>Logistic Regression, Support Vector Machines: Binary Linear Support Vector Machines, Optimal Hyperplane, Kernel Functions, Solving Non-linear Classification problems with Linear Classifier. Applications of Support Vector Machines. Dimensionality Reduction, Principal Component Analysis, Fisher Linear Discriminant, Quadratic Discriminant Analysis, Multiple Discriminant Analysis..</p>	
<p><b>Textbooks</b></p> <ol style="list-style-type: none"> <li>1. Tom M. Mitchell, “Machine Learning”, McGraw-Hill, 2010</li> <li>2. Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995</li> </ol> <p><b>Reference Books</b></p>	

1. Introduction to Machine Learning by Ethem Alpaydin, MIT Press
2. Pattern Classification by Duda and Hart. John Wiley publication
3. The Elements of Statistical Learning by Trevor Hastie, Robert Tibshirani, Jerome Friedman, Springer.
4. Pattern Recognition and Machine Learning, Christopher M. Bishop, Springer
5. Machine Learning: A probabilistic Perspective, by Kevin P. Murphy, MIT Press

**COURSE OUTCOMES (CO):**

*Upon completion of the course, the students will be able to:*

*CO1: Develop and apply pattern classification algorithms to classify multivariate data.*

*CO2: Develop and apply regression algorithms for finding relationships between data variables.*

*CO3: Apply a variety of learning algorithms to data.*

*CO4: Perform evaluation of learning algorithms and model selection?*

*CO5: Write scientific reports on computational machine learning methods, results and conclusions.*

**COURSE TITLE: Software Engineering**

**Course Code: MCA21204CR**

**Examination Scheme**

**Total number of Lecture Hours: 40**

**External**

**80**

**Internal**

**20**

**Lecture (L): 3**

**Practicals(P): -**

**-**

**Tutorial (T): 1**

**1**

**Total Credits**

**4**

**Course Objectives**

- **Understand Software Engineering Fundamentals:** Gain knowledge of the nature, goals, and challenges of software engineering and its historical context.
- **Apply Software Development Processes:** Learn and utilize various software development models, including Waterfall, Agile, and Spiral.
- **Measure Software Processes and Projects:** Analyze software processes using measures, metrics, and models like CMMI and COCOMO.
- **Master Requirements Engineering:** Develop skills in eliciting, analyzing, modeling, and validating both functional and non-functional requirements.
- **Design Engineering Proficiency:** Understand design principles, modularity, and patterns, and apply function-oriented and object-oriented design methodologies.
- **Achieve Competence in Software Testing and Reliability:** Understand core testing concepts and techniques, and explore software reliability and reengineering processes.

<b>Course Content</b>	<b>TEACHING HOURS</b>
<b>UNIT 1: Fundamentals of Software Engineering</b>	<b>10 Hrs</b>
<p>Concept and Nature of Software: Concept and Nature of Software, Software Crisis, Software Engineering – Concept, Goals and Challenges, Software Engineering Approach.</p> <p>Software Development Process, Process Models - Waterfall Model, Evolutionary and Throwaway Prototyping Model, Incremental and Iterative Models, Spiral Model, Agile Process Model, Component based and Aspect Oriented development</p> <p>Software Process and Project Measurement: Measures, Metrics and Indicators, Size -Oriented Metrics vs. Function - Oriented Metrics, Capability Maturity Model Integration (CMMI). COCOMO Model.</p>	
<b>UNIT 2: Requirements Engineering</b>	<b>10 Hrs</b>

<p>Introduction to Requirements Engineering - Why, What and Where. Requirements Types: functional and nonfunctional requirements.</p> <p>Requirement Engineering Framework. Requirement Elicitation Process and Techniques. Requirement Analysis and Modelling, Requirements prioritization, verification, and validation.</p>	
<b>UNIT 3: Design Engineering</b>	<b>10 Hrs</b>
<p>Basics of Design Engineering - Abstraction, Architecture, Patterns, Separation of concerns, Modularity, Functional Independence, refinement, Refactoring.</p> <p>Function oriented design, Design principles, Coupling and Cohesion, Design Notations &amp; Specifications, Structured Design Methodology.</p> <p>Object-Oriented Design - Design Concepts, Design Methodology, Object-oriented analysis and design modeling using Unified Modeling Language (UML), Dynamic &amp; Functional Modeling, Design Verification.</p>	
<b>UNIT 4: Software Testing and Reliability</b>	<b>10 Hrs</b>
<p>Software Testing – Concepts, Terminology, Testing &amp; Debugging, Adequacy Criteria, Static vs. Dynamic Testing, Black Box vs. White Box Testing. Structural testing and its techniques. Functional Testing and its techniques, Mutation testing, Random Testing. Non-Functional Testing like Reliability, Usability, Performance and Security Testing.</p> <p>Introduction to Software Reliability: Basic Concepts, Correctness Vs Reliability, Software Reliability metrics, Operational Profile, Reliability Estimation and Predication, Reliability and Testing.</p> <p>Concept of Software reengineering, reverse engineering and change management.</p>	

**Tutorial  
UNIT I**

**Tutorial #1**

- a. How is Software Engineering different from other Engineering fields?
- b. Study and compare different software process models
- c. Identify the suitable applications for the individual process model.

**Tutorial #2**

- a. Calculate the function points for the following data. The total CAV is 36. Number of user inputs=15 - Simple:- 5, Average:- 7, Complex:- 3 Number of user outputs=14 - Simple:- 5, Average:- 5, Complex:-4 Number of user inquiries=8 - Simple:- 2, Average:- 3, Complex:- 3 Number of files =6 - Simple:- 3, Average:- 1, Complex:- 2 Number of external interfaces=13 - Simple:- 4, Average:- 7, Complex:- 2
- b. Based on the result calculate the various metrics like productivity, Quality, Cost, Documentation.

**Tutorial #3**

- a. Calculate the effort, duration and average persons required for basic CoCoMo model for 70000 LOC assuming project type is semi-detached.
- b. Calculate the effort, duration and average persons required for intermediate CoCoMo model for 50000 LOC assuming project type is organic and EAF is 2.92.
- c. Calculate the effort, duration and average persons required in basic CoCoMo model for organic project type given that total FP is 651 and the 1 FP=2500 LOC

**UNIT II**

**Tutorial #1**

- a Identify the different requirements of the application for application like Library Management System.
- b. Identify the different requirements of the application for application like University System.

**Tutorial #2**

- a Classify the requirements into functional and non-functional requirements for Library Mgmt. System.
- b. Classify the requirements into functional and non-functional requirements for University System.

**Tutorial #3**

- a. Prepare a requirement document (SRS) for the same as per the IEEE standard for Library Mgmt. System.
- b. Prepare a requirement document (SRS) for the same as per the IEEE standard for university

System.

### **UNIT III**

#### **Tutorial #1**

Which of the following design principle(s) have been violated in the following scenarios?

- a) Abstraction b) Decomposition and Modularization c) Coupling & Cohesion d) Encapsulation
- e) Sufficiency, Completeness and Primitiveness
- f) All
- i. An algorithm documented as part of design is not understandable by the programmers
- ii. Important information of a module is directly accessible by other modules.
- iii. Too many global variables in the program after implementing design.
- iv. Unfulfilled requirements in the code after the design has been implemented.
- v. Code breaks in unexpected places.
- vi. All data of all classes in public.
- vii. Cyclic dependencies among classes
- viii. Huge class doing too many unrelated operations.
- ix. Several unrelated functionalities/tasks are carried out by a single module.

#### **Tutorial #2**

Design the system using structured design for Library Management System by using DFD, ER diagrams and structure chart whichever applicable.

- i. Identify various processes, data store, input, output etc. of the system.
- ii. Use processes at various levels to draw the DFDs.
- iii. Identify various modules, input, output etc. of the system
- iv. Use various modules to draw structured charts.

#### **Tutorial #3**

Design the system using Object-Oriented design for Library Management System using UML modeling technique appropriately and

- i. Identify various processes, use-cases, actors etc. of the system
- ii. Identify various elements such as classes, member variables, member functions etc. of the class diagram. Draw the class diagram.
- iii. Identify various elements such as various objects of the object diagram. Draw the object diagram.
- iv. Identify various elements states and their different transition of the state-chart diagram. Draw the state-chart diagram.
- v. Identify various elements such as controller class, objects, boundaries, messages etc. of the sequence diagram. Draw the sequence diagram as per the norms.
- vi. Identify various elements such as for the sequence diagram of the collaboration diagram.

<p style="text-align: center;">Draw the collaboration diagram as per the norms</p> <p>vii. Identify various elements such as different activity their boundaries etc. of the activity diagram. Draw the activity diagram.</p> <p>viii. Identify various elements of the component diagram such as the various components like client, server, network elements etc. Draw the component diagram.</p> <p>ix. Identify various elements such as the hardware components of the deployment <b>diagram</b>. Draw the deployment diagram.</p> <p style="text-align: center;">UNIT IV Tutorial #1</p> <p>a. Write test cases for login page of your university admission system. b. Write test cases for simple calculator program. c. Write test cases for online examination module.</p> <p style="text-align: center;">Tutorial #2</p> <p>Due to surge in online examination requirements, a company is intending to test its software capable of examining 5000 students at a time for MCQs. Indicate the performance testing strategy required to ensure that it is capable of supporting 5000 simultaneous users.</p> <p style="text-align: center;">Tutorial #3</p> <p>a. Calculate the reliability of the software product using sample data. b. Calculate various reliability metrics using sample data and discuss applicability of each metric.</p>
<b>Textbooks</b>
1. Pfleeger and Atlee, Software Engineering: Theory and Practice, 4th Edition, Pearson, 2010
<b>Reference Books</b>
<p>2. Sommerville, Ian - Software Engineering. Pearson , 9/e , 2011.</p> <p>3. Pankaj Jalote - An Integrated approach to Software Engineering, Narosa Publication.</p> <p>4. Software Engineering: Principles and practice, 3rd Edition, Hans Van Vliet, Wiley.</p> <p>5. James F. Peters Software Engineering – An Engineering Approach, Wiley&amp; Sons.</p> <p>6. Roger Pressman, Software Engineering: A Practitioners Approach”,McGraw-Hill Publications</p>
<b>COURSE OUTCOMES (CO):</b>



**CO1:** Students will explain the nature of software, the software crisis, and the goals and challenges of software engineering.

**CO2:** Students will implement appropriate software development models such as Waterfall, Agile, and Spiral based on project needs.

**CO3:** Students will assess software processes using metrics and models like CMMI and COCOMO.

**CO4:** Students will perform requirement elicitation, analysis, modeling, prioritization, verification, and validation.

**CO5:** Students will apply design principles and object-oriented design methodologies using UML.

**CO6:** Students will execute various testing techniques and evaluate non-functional requirements like reliability and performance.

<b>COURSE TITLE: Computer Networks</b>							
<b>Course Code:MCA21103CR</b>						<b>Examination Scheme</b>	
<b>Total number of Lecture Hours:48</b>						<b>External</b>	<b>80</b>
						<b>Internal</b>	<b>20</b>
<b>Lecture (L):3</b>	<b>-</b>	<b>Practical's (P):</b>	<b>2</b>	<b>Tutorial (T):</b>	<b>-</b>	<b>Total Credits</b>	<b>4</b>
<b>Course Objectives</b>							
<ul style="list-style-type: none"> <li>✓ To gain a comprehensive understanding of the core principles of computer networking, including protocol design, protocol layering, algorithm design, and performance evaluation.</li> <li>✓ To acquire detailed knowledge of the OSI model and TCP/IP protocol suite and understand the design issues and protocols used in the data link layer and MAC sublayer.</li> <li>✓ To Understand the design issues of the network layer, including various routing algorithms and congestion control mechanisms.</li> <li>✓ To learn about the protocols used in the transport and application layers, including their design and functionality.</li> </ul>							

<b>Course Content</b>	<b>TEACHING HOURS</b>
<b>UNIT 1:</b>	<b>-12 Hrs</b>
Goals and applications of networks. LAN, MAN & WAN architectures. Concept of WAN subnet. Overview of existing networks. OSI Reference Model Architecture, TCP/IP Model and their comparison. Protocol layers and service models. OSI and Internet protocols.	
<b>UNIT 2:</b>	<b>12 Hrs</b>
Internetworking concept and architectural model. Connection-oriented and connection-less approaches. Discuss ATM and Ethernet. Concept of Virtual Circuits, Concept of Autonomous systems and Internetwork Routing. Classful IP addresses. Subnetting, Subnet addressing, IP Multicasting. Internet Protocol (IP): connectionless delivery of datagrams (MTU, fragmentation, reassembly). IP header structure. IP Addressing. Efficiency and consistency trade-offs.	
<b>UNIT 3:</b>	<b>12 Hrs</b>
Internet control protocols: ICMP, ARP and RARP. Concepts of delay, security, and Quality of Service (QoS). Reliable data transfer. Stop-and-Go evaluation. TCP and UCP semantics and syntax. TCP RTT estimation. Principles of congestion control. Principles of routing. Link-state and distance vector routing. Routing algorithms: Inter- and intra-domain routing. RIP, OSPF, BGP. CIDR. Transport Layer: UDP and TCP concepts. Socket API for Network Programming.	
<b>UNIT 4:</b>	<b>12 Hrs</b>
Client-Server application development using TCP & UDP sockets. Basic Server Architectures. Network Security: Overview of threats, cryptography, authentication, and firewalls their components. Encryption techniques and examples of encryption standards. Network management including SNMP. Network troubleshooting.	

## **Lab Manual**

### **Unit I**

#### Lab Sheet 1

Q1. Network components such as Modem, Gateways, Routers, Switches, Cables etc.

Q2. Various network softwares, services and applications.

#### Lab Sheet 2

Q1. Network trouble shooting Techniques: Trouble shooting basic TCP/IP problems.

Q2. Commands like ipconfig, getmac, tracert, pathping, arp, ping, netstat, finger etc

#### Lab Sheet 3

Q1. Straight cabling, Cross cabling, Signal testing, T568A and B wiring standards (including hands on practice)

### **Unit II**

#### Lab Sheet 1

Q1. Program that prints the address of [www.bitmesra.ac.in](http://www.bitmesra.ac.in)

Q2. Program that prints all the addresses of [www.indianrail.gov.in](http://www.indianrail.gov.in)

#### Lab Sheet 2

Q1. Program that scans lower ports and prints them.

Q2. Program to list host names from command line, attempt to open socket to each one and print the remote host, the remote port, the local address and the local port.

#### Lab Sheet 3

Q1. Program for splitting the URLs entered into command line into component parts.

### **Unit III:**

#### Lab Sheet 1

Q1. Program to list all the interfaces available on a workstation.

Q2. Basics of TCP/IP and UDP/IP socket Programming

#### Lab Sheet 2

Q1. Program for “echo” client. The Client enters data to the server, and the server echoes the data back to the clients.

#### Lab Sheet 3

Q1. Program for “echo” Server. The Server listens at the port specified and reads from client and echoes back the result.

### **Unit IV**

Lab Sheet 1

Q1. Basics of Serial Port programming

Lab Sheet 2

Q1. Program to write out "Hello World" to a serial port or to a USB to Serial Converter.

Lab Sheet 3

Q1. Simple RPC Programming. (Introductory level)

<b>Textbooks</b>
Andrew Tanenbaum, “Computer Networks”, 6th Edition by Pearson, 2022
<b>Reference Books</b>
Behrouz A. Foruzan - Data communication and Networking, 6th edition, TMH, 2022
<b>COURSE OUTCOMES (CO):</b>
<p>Upon successful completion of this course, learners will be able to:</p> <ol style="list-style-type: none"> <li>1. <b>List the functionalities of different layers</b> in both the OSI and TCP/IP reference models.</li> <li>2. <b>Analyze complex networking problems</b>, including the concepts of internetworking, and the differences between connection-oriented and connection-less approaches.</li> <li>3. <b>Describe the principles of switching and routing algorithms</b> used in computer networks.</li> <li>4. <b>Distinguish between TCP and UDP</b> formats and procedures, understanding their respective uses and characteristics.</li> <li>5. <b>Identify, formulate, and analyze complex networking issues</b>, applying principles and concepts learned throughout the course.</li> </ol>

<b>COURSE TITLE: Organizational Behaviour</b>			
<b>Course Code: MCA21307DCE</b>		<b>Examination Scheme</b>	
<b>Total number of Lecture Hours: 48</b>		<b>External</b>	<b>80</b>
		<b>Internal</b>	<b>20</b>

<b>Lecture (L):</b>	<b>3</b>	<b>Practicals(P):</b>	<b>-</b>	<b>Tutorial (T):</b>	<b>1</b>	<b>Total Credits</b>	<b>4</b>
<b>Course Objectives</b>							
<ul style="list-style-type: none"> <li>• The main objective of Organizational Behavior is to understand the human interactions in an organization find what is driving it and influence it for getting better results for attaining business goals.</li> <li>• The organizations in which people work have an effect on their thoughts, feelings, and actions. These thoughts, feelings, and actions, in turn, affect the organization itself.</li> <li>• Organizational behavior studies the mechanisms governing these interactions, seeking to identify and foster behaviors conducive to the survival and effectiveness of the organization.</li> </ul>							
<b>Course Content</b>						<b>TEACHING HOURS</b>	
<b>UNIT 1:</b>						<b>12 Hrs</b>	
Definition, need and importance of organizational behaviour, Nature and scope, Frame work, Organizational behaviour models. Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behaviour modification.							
<b>UNIT 2:</b>						<b>12 Hrs</b>	
Misbehaviour – Types – Management Intervention. Emotions - Emotional Labour – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation – Measurement- Values. Perceptions – Importance – Factors influencing perception – Interpersonal perception- Impression Management. Motivation – importance – Types – Effects on work behaviour							
<b>UNIT 3:</b>						<b>12 Hrs</b>	

<p>Organization structure – Formation – Groups in organizations Influence – Group dynamics – Emergence of informal leaders and working norms Group decision making techniques – Team building - Interpersonal relations Communication – Control. Meaning – Importance – Leadership styles – Theories – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.</p>	
<b>UNIT 4:</b>	<b>12 Hrs</b>
<p>Organizational culture and climate, Factors affecting organizational climate, Job satisfaction – Determinants – Measurements – Influence on behaviour.  Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change.  Stress, Work Stressors, Prevention and Management of stress, Balancing work and Life. Organizational development, Characteristics, objectives, Organizational effectiveness</p>	
<p><b>Tutorial  Unit 1</b>  Tutorial 1</p> <p>Q1 Define Organisational Behaviour. State its importance and scope.  Q2 Define planning. Explain the steps involved in planning and state the limitations in planning  Q3 Explain the importance of planning as the beginning of the process of management. State how decision making plays a vital role in the exercise of planning.</p> <p>Tutorial 2</p> <p>Q1 Distinguish clearly between intrapersonal and interpersonal conflicts. Quote an example. How does it deteriorate teamwork in the organisation?  Q2 State how systems Approach and contingency Approach have played the role of integrating various fragmented approaches of management  Q3 Explain the theory of transactional analysis. Discuss ego states as its link</p> <p>Tutorial 3</p> <p>Q1 Which leadership style is suitable to HR Manager of I.T. industry in the present era. Give justification  Q2 Discuss the merits and demerits of formal and informal group formation in industrial organisation functioning at the national level  Q3 Elaborate on the evolution of management thought &amp; its relevance in today’s scenario</p> <p><b>UNIT 2</b></p> <p>Tutorial 1</p> <p>Q1 Define motivation. Elaborate A.H.Maslow’ s hierarchy theory of motivation.  Q2 “Controlling techniques are very effective in an organisation”. Elaborate  Q3 Write short notes on Formation of the team. b) Principles of decision making. c) Dimensions of attitude  d) MBO. e) Stress management.</p>	



### Tutorial 2

- Q1 Elaborate on the SOBC model of O.B. Give Examples
- Q2 Explain the concept of conflict management with its Process.
- Q3 Compare A.H. Maslow's theory with Herzberg's theory of Motivation

### Tutorial 3

- Q1 Explain the meaning of personality. What are the determinants of personality? Give relevant examples.
- Q2 Distinguish between formal organizations & informal organizations. Explain the importance of the formation of teams
- Q3 Write short notes on a) Functions of management. b) Morale Indicators. c) Dimensions of attitude. d) Planning premises.

e) Job satisfaction.

## **UNIT 3**

### Tutorial 1

- Q1 "Nothing is constant, the only change is constant". Explain the statement w.r.t. factor responsible for the change.
- Q2 What is departmentalization? Explain the various types of departmentalization?
- Q3 Write short notes on 1) Decision-making process. 2) Leadership styles. 3) Models of OB. 4) Functions of Management. 5) Line and staff authority.

### Tutorial 2

- Q1 What are the different types of motives? Explain A.H.Maslow's hierarchy need a theory of motivation
- Q2 "Its is remarked that attitudes shape the personality of an individual". Comment.
- Q3 Explain nature 7 purposes of planning with its steps, in detail.

### Tutorial 3

- Q1 what do you understand by 'Motives' and explain the Herzberg theory of motivation, with Relevant examples.
- Q2 Define stress. Explain ill effects of stress on human beings. How do people manage stress
- Q3 Enumerate various factors responsible for the change

## **UNIT 4**

### Tutorial 1

- Q1 What is conflict? What are the sources of conflict?
- Q2 What can be the consequences of conflict on an organisation?
- Q3 How can grievance affect an organisation and its employees? Describe the process of handling grievance

### Tutorial 2

- Q1 What are the Factors affecting organizational climate
- Q2 How can an employee balance his work and personal life in an organization

Q3 What do you mean by Organisational Culture? State its elements. Also discuss how organisational culture can be created and sustained.

Tutorial 3

Q1 Explain in details the various types of culture?

Q2 How to create a positive organisational culture?

Q3 Write short notes on: Strong Vs. Weak Culture II. Soft Vs. Hard Culture III. Formal Vs Informal Culture IV. Concept of Workplace Spirituality

**Textbooks**

7. Stephen P. Robins, Organisational Behavior, PHI Learning / Pearson Education, 11th edition.

8. Fred Luthans, Organisational Behavior, McGraw Hill, 11th Edition

**Reference Books**

1. Schermerhorn, Hunt and Osborn, Organisational behaviour, John Wiley

2. Udai Pareek, Understanding Organisational Behaviour, 2nd Edition, Oxford Higher Education.

3. Mc Shane & Von Glinov, Organisational Behaviour, 4th Edition, Tata Mc Graw Hill.

4. Hellrigal, Slocum and Woodman, Organisational Behavior, Cengage Learning, 11th Edition.

5. Ivancevich, Konopaske & Maheson, Organisational Behaviour & Management, 7th edition, Tata McGraw Hill.

**COURSE OUTCOMES (CO):**

**CO1:** Students will be able to define organizational behavior and explain its importance within organizations.

**CO2:** Students will be able to describe different personality types and the factors influencing personality development.

**CO3:** Students will identify various types of misbehavior in organizations and propose management interventions to address these issues.

**CO4:** Students will analyze group dynamics, including the emergence of informal leaders and working norms.

**CO5:** Students will compare and contrast leadership styles, theories, and the distinctions between leaders and managers. They will also identify sources of power, power centers, and the impact of power and politics in organizations.

<b>COURSE TITLE: Management Information Systems</b>							
<b>Course Code:</b> MCA21401OE						<b>Examination Scheme</b>	
<b>Total number of Lecture Hours: 20</b>						<b>External</b>	<b>40</b>
						<b>Internal</b>	<b>10</b>
<b>Lecture (L):</b>	<b>2</b>	<b>Practicals(P):</b>	<b>-</b>	<b>Tutorial (T):</b>	<b>-</b>	<b>Total Credits</b>	<b>2</b>
<b>Course Objectives</b>							
<ul style="list-style-type: none"> <li>• Information Systems (IS) enables new approaches to improve efficiency and efficacy of business models. This course will equip the students with understanding of role, advantages and components of an Information System.</li> <li>• The objective of the course is to help students integrate their learning from functional areas, decision making process in an organization and role of Information Systems to have a vintage point in this competitive world.</li> </ul>							
<b>Course Content</b>						<b>TEACHING HOURS</b>	
<b>UNIT 1:</b>						<b>10 Hrs</b>	
MIS Basics, System View of Business, Process of MIS, Development of MIS within the organization, Management Process, Information Needs, System Approach in Planning Organizing and Controlling MIS. Planning, Implementation and Controlling of Management Information System.							
<b>UNIT 2:</b>						<b>10 Hrs</b>	

Fundamentals of Data Processing, Computer Operation of Manual Information System, Components of Computer Systems, Flow Chart, Conversion of Manual to Computer Based Systems, Computer Systems Software, Application Software. Managerial Decision Making, characteristics and components of Decision Support System.

**Text Book:** Software Project Management, Bob Hughes and Mike Cotterell, McGraw Hill

**Reference Books: -**

1. Software Project Management A Unified Framework, Walker Royce, Addison-Wesley
2. A practitioner's Guide to Software Engineering, Roger Pressman, Tata McGraw Hill 2014 8<sup>th</sup> edition.
3. Basics of Software Project Management, NIIT, Prentice-Hall India, Latest Edition

**COURSE OUTCOMES (CO):**

- CO1:** Define the principles of project management for developing software.  
**CO2:** Explain various project management scheduling techniques.  
**CO3:** Apply different techniques of project monitoring, control and review.  
**CO4:** Classify various project management tools and estimate the risks involved in project activities.  
**CO5:** Assess issues related to project quality and staffing.  
**CO6:** Discuss the effect of project management practices in an organization

<b>COURSE TITLE: Design and Analysis of Algorithms</b>						
<b>Course Code:</b>	<b>MCA21301CR</b>			<b>Examination Scheme</b>		
<b>Total number of Lecture Hours: 48</b>				<b>External</b>	<b>80</b>	
				<b>Internal</b>	<b>20</b>	
<b>Lecture (L):</b>	<b>3</b>	<b>Practicals(P):</b>	<b>2</b>	<b>Tutorial (T):</b>		<b>Total Credits</b>
<b>4</b>						
<b>Course Objectives</b>						
<ul style="list-style-type: none"> <li>• Gain a solid foundation in algorithms, their analysis, and the growth of functions.</li> <li>• Apply asymptotic notations and techniques to study the time and space complexity of algorithms.</li> <li>• Explore and apply methods such as recurrences, the Master Method, and randomized algorithms.</li> <li>• Utilize divide and conquer, greedy, dynamic programming, backtracking, and branch and bound strategies to solve complex problems. <ul style="list-style-type: none"> <li>• Learn about P, NP, NP-hard, and NP-complete problems, and understand the significance of Cook's Theorem.</li> </ul> </li> <li>• Evaluate the need for and implement approximation algorithms for solving complex optimization problems.</li> </ul>						
<b>Course Content</b>					<b>TEACHING HOURS</b>	
<b>UNIT 1: Fundamentals of Algorithm Analysis</b>					<b>12 Hrs</b>	
Introduction to Algorithms, Analysis of Algorithms, Growth of Functions, Asymptotic notations (3L) Recurrences, Substitution method, Iteration method, Recursion trees (4L) The Master Method, Time and Space Complexity study of some basic algorithms. (3L)						
<b>UNIT 2: Advanced Algorithmic Techniques</b>					<b>12 Hrs</b>	
Randomized Algorithms: Identifying the repeated element, Primality testing, Advantages and Disadvantages. (3L) Divide and Conquer Strategy: Binary search, Quick sort, Merge sort (3L) Greedy Method, General						

method, Knapsack problem, Single source shortest paths.(4L)	
<b>UNIT 3: Optimization and Search Strategies</b>	<b>12 Hrs</b>
Dynamic programming Strategy: All pair shortest paths, Traveling salesman problems. (3L) Backtracking Strategy: 8-Queen problem, Sum of subsets, Knapsack problem.(4L) Branch and Bound Strategy: Least Cost Branch and Bound, 8-Queen Problem(3L)	
<b>UNIT 4: Computational Complexity and Approximation Algorithms</b>	<b>12 Hrs</b>
Lower boundary theory, Lower bound theory through reductions, P and NP problems. NP hard and NP complete problems, Cook's Theorem (5L) Approximate Algorithms and their need, The vertex Cover Problem, The traveling salesman problem, The subset sum problem (5L)	
<p><b>LAB MANUAL</b></p> <p><b>Unit 1:</b></p> <p><b>LabSheet1:</b></p> <ol style="list-style-type: none"> <li>1. Write a program for Linear Search.</li> <li>2. Implement recursive solution to the Tower of Hanoi puzzle.</li> </ol> <p><b>LabSheet2:</b></p> <ol style="list-style-type: none"> <li>1. Write a program for iterative binary search.</li> <li>2. Sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of n &gt; 5000 and record the time taken to sort. Plot a graph of the time taken versus n on graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using C how the divide -and- conquer method works along with its time complexity analysis: worst case, average case and best case.</li> </ol> <p><b>LabSheet3:</b></p> <ol style="list-style-type: none"> <li>1. Print all the nodes reachable from a given starting node in a digraph using BFS method.</li> <li>2. Obtain the Topological ordering of vertices in a given digraph</li> </ol> <p><b>Unit 2:</b></p> <p><b>LabSheet1:</b></p> <ol style="list-style-type: none"> <li>1. Write a program for recursive binary search.</li> <li>2. Write a program for Merge Sort.</li> </ol> <p><b>LabSheet2:</b></p>	

1. Write a program for finding maximum and minimum number using Divide and conquer method.
2. Write a program to sort given set of elements using heap

**. LabSheet3:**

1. Implement Knapsack Problem using greedy method.
2. Write a program for Single Source Shortest path algorithm using greedy method.

**Unit 3:**

**LabSheet1:**

1. Implement 0/1 knapsack using dynamic programming.
2. Write a program for travelling salesman problem using Dynamic programming.

**LabSheet2:**

1. Implement BFS.
2. Implement DFS.

**LabSheet3:**

1. Write C programs to implement All-Pairs Shortest Paths problem using Floyd's algorithm.
2. Implement 8-Queens problem and analyze its time complexity.

**Unit 4:**

**LabSheet1:**

1. Implement N-Queens problem using Backtracking.
2. Write a program for Vertex Cover Problem..

**LabSheet2:**

Design and implement in C to find a subset of a given set  $S = \{S_1, S_2, \dots, S_n\}$  of  $n$  positive integers whose SUM is equal to a given positive integer  $d$ . For example, if  $S = \{1, 2, 5, 6, 8\}$  and  $d = 9$ , there are two solutions  $\{1, 2, 6\}$  and  $\{1, 8\}$ . Display a suitable message, if the given problem instance doesn't have a solution.

**LabSheet3:**

1. Compute the transitive closure of a given directed graph using DFS

**Textbooks**

1. Horowitz, Sahni, Rajasekaran "Fundamentals of Computer Algorithms", Galgotia Publications

**Reference Books**

1. Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms", 2nd edition, PHI.
2. Michael T. Goodrich, Roberto Tamassia "Algorithm Design and Applications", Wiley
3. Aho, Hopcroft and Ullman, "The Design and Analysis of Computer Algorithms", Pearson

**COURSE OUTCOMES (CO):**

- CO1:** Demonstrate the ability to analyze and evaluate the efficiency of algorithms using asymptotic notations and various complexity analysis techniques.
- CO2:** Solve problems using advanced algorithmic techniques, including recurrences, the Master Method, and randomized algorithms.
- CO3:** Implement divide and conquer, greedy, and dynamic programming strategies to efficiently solve computational problems like sorting, knapsack, and shortest paths.
- CO4:** Apply backtracking and branch and bound techniques to tackle complex problems such as the 8-Queen problem and least-cost optimization.
- CO5:** Gain a deep understanding of computational complexity concepts, including P, NP, NP-hard, and NP-complete problems, and the significance of Cook's Theorem.
- CO6:** Evaluate the necessity of approximation algorithms and effectively apply them to solve optimization problems like the vertex cover, traveling salesman, and subset sum problems.

<b>COURSE TITLE: Operating System</b>							
<b>Course Code:</b> MCA21303CR				<b>Examination Scheme</b>			
<b>Total number of Lecture Hours: 48</b>				<b>External</b>		<b>80</b>	
				<b>Internal</b>		<b>20</b>	
<b>Lecture (L):</b>	<b>4</b>	<b>Practicals(P):</b>	<b>-</b>	<b>Tutorial (T):</b>	<b>-</b>	<b>Total Credits</b>	<b>4</b>
<b>Course Objectives</b>							
1 Understand Fundamental Concepts of Operating Systems 2 Develop Skills in Process Management and Synchronization 3 Explore Distributed Operating Systems 4 Gain Expertise in Deadlocks Management 5 Explore Real Time Operating System 6 Acquire Skills in Real-Time Task Scheduling							
<b>Course Content</b>						<b>TEACHING HOURS</b>	
<b>UNIT 1:</b>						<b>12 Hrs</b>	



Types of Operating Systems; Operating System Structures – Processes, Scheduling criteria, Scheduling Algorithms. Processor allocation and scheduling in distributed systems - System Models, Load balancing and sharing approach, fault tolerance; Real time distributed systems.	
<b>UNIT 2:</b>	<b>12 Hrs</b>
Interprocess Communication and Synchronization, Classical problems, Critical section, Semaphores, Monitors. Synchronization in Distributed Systems - Clock Synchronization and related algorithms, Logical Clocks. Mutual Exclusion: Centralized & Distributed (Contention & Token) Algorithms. Election Algorithms: Bully Algorithm, Invitation Algorithm.	
<b>UNIT 3:</b>	<b>12 Hrs</b>
Memory Management: Address Spaces, Virtual Memory. Page Replacement Algorithms, Design and Implementation Issues for Paging Systems, Segmentation. General architecture of Distributed Shared Memory systems; Design and implementation issues of DSM; granularity - Structure of shared memory space, consistency models, replacement strategy, thrashing.	
<b>UNIT 4: Deadlocks</b>	<b>12 Hrs</b>
Deadlocks characterization, Methods for handling deadlocks. Deadlock - Prevention, Avoidance, Detection, Recovery. Deadlock Detection - Distributed Algorithms Threads - Characteristics, Advantages & Disadvantages, Design Issues & Usage. Client Server model; Remote procedure call and implementation issues.	
<p><b>LAB MANUAL</b></p> <p><b>UNIT I</b></p> <p>Lab Sheet 1</p> <p>1. Write a program to implement process systemcalls.</p> <p>1. Write a program to implement I/O systemcalls</p> <p>Lab Sheet 2:</p> <p>1. Write a program to simulate the SJF scheduling algorithm. The program should read the following inputs: • Number of processes • Burst time requirement of each process The program should generate the following outputs: • Process statistics after each context switch • Average Turn around time • Average Waiting time</p> <p>2. Write a program to simulate the Round Robin scheduling algorithm. The program should read the following inputs: • Number of processes • Burst time requirement of each process • Length of the Time Slice The program should generate the following outputs: • Process statistics after each context switch</p>	

Average Turn around time • Average Waiting time

Lab Sheet 3:

1. Write a program to simulate FCFS scheduling algorithm.
2. Write a program to simulate priority scheduling algorithm.

## Unit II

Lab Sheet 1:

1. Write a program to implement the producer – consumer problem using semaphores.
2. Write a program to implement IPC using shared memory.
3. Write a program to simulate the concept of dining philosophers problem.

Lab Sheet 2:

1. Create client server programs using RPC wherein the server accepts a number from the client and returns the square of the number which is then displayed by the client. Use rpcgen to generate the stubs automatically.
2. Write a program to simulate Clock Synchronization in Distributed Systems using Lamport's Algorithm.

Lab Sheet 3:

1. Write a program to simulate the Bully Election algorithm.

## UNIT III

Lab Sheet 1

1. Write a program to implement and simulate MFT (Memory management with fixed partitioning technique) algorithm.
2. Write a program to implement and simulate MFT (Memory management with variable partitioning technique) algorithm
3. Write a program to simulate the following contiguous memory allocation techniques a) Worst-fit b) Best-fit c) First-fit

Lab Sheet 2:

1. Write a program to simulate the LRU page replacement algorithm. The program should read the following inputs: • Length of the reference string • Reference string • Number of page frames The program should generate the following outputs: • Page replacement sequence after each reference • Number of page faults
2. Write a program to simulate the LFU page replacement algorithm. The program should read the following inputs: • Length of the reference string • Reference string • Number of page frames The program should generate the following outputs: • Page replacement sequence after each reference • Number of page faults
3. Write a program to simulate the FIFO page replacement algorithm.

Lab Sheet 3:

1. Write a set of programs to use the concept of shared memory through LINUX system calls. • One process creates a shared memory segment and writes a message into it. • Another process opens the segment, reads the message and outputs the message to standard output. Some of the important system calls to be used include: shmget(), shmat(), shmctl() etc.

## Unit IV

### Lab Sheet 1:

1. Write a program to simulate the Banker's Algorithm for Deadlock Avoidance. The program should read the following inputs: • Number of Processes • Number of resource types • Current allocation and Maximum allocation of resources to each process • Currently Available Resources • New request details  
The program should generate the following outputs: • Determine whether the system is in the safe state or not
2. Modify the previous program to determine the safe sequence if the system is in safe state.

### Lab Sheet 2:

1. Write a program to implement deadlock detection (resource allocation graph) algorithm.
2. Write a program to simulate deadlock prevention.

### Lab Sheet 3:

1. Write a program to implement mutual exclusion of threads on LINUX using the pthread.h library Some of the important system calls to be used include: pthread\_mutex\_lock, pthread\_self, pthread\_create, pthread\_exit

### Textbooks:

*Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System Principles", John Wiley.*  
*Pradeep K. Sinha, "Distributed Operating Systems : Concepts and Design", PHI*  
*Rajib Mall, Real-Time Systems: Theory and Practice (Second Edition), Pearson Education.*

### Reference Books:

*Andrew.S. Tanenbaum, "Modern Operating Systems", PHI. Andrew. S. Tanenbaum, "Distributed Operating System", PHI.*  
*Andrew S. Tanenbaum, Modern Operating Systems (Third Edition), Pearson Education.*  
*David E. Simon, An Embedded Software Primer, Pearson Education.*  
*Laplante, P., Real-Time Systems Design and Analysis (Third Edition), IEEE/Wiley Interscience.*  
*Jane W.S. Liu, Real-Time Systems (Sixth Edition), Pearson Education.*  
*Raj Kamal, Embedded Systems: Architecture, Programming and Design (Third Edition), Tata McGraw-Hill Education*

### COURSE OUTCOMES (CO):

- **CO1: Students will understand the fundamental concepts and functions of an operating system.**
- **CO2: Students will develop skills in process management and CPU scheduling techniques.**
- **CO3: Students will acquire comprehensive knowledge of memory management methods and their practical applications.**
- **CO4: Students will achieve proficiency in the principles and design of distributed systems.**
- **CO5: Students will gain expertise in identifying, preventing, and resolving deadlocks.**
- **CO6: Students will acquire expertise in real-time systems.**

**COURSE TITLE: Accounting and Management Control**

<b>Course Code: MCA21104CR</b>				<b>Examination Scheme</b>		
<b>Total number of Lecture Hours: 24</b>				<b>External</b>	<b>40</b>	
				<b>Internal</b>	<b>10</b>	
<b>Lecture (L):</b>	<b>2</b>	<b>Practicals(P):</b>	<b>Tutorial (T):</b>	<b>-</b>	<b>Total Credits</b>	<b>2</b>

**Course Objectives**

- Gain knowledge of the contributions made by key figures in the evolution of management, including Taylor, Mayo, and Fayol.
- Develop a comprehensive understanding of the core functions of management, including planning and decision-making.
- Understand the fundamental principles, objectives, and branches of accounting.
- Familiarize with the rules of debit and credit and the practical systems of bookkeeping, including the preparation of cashbooks, profit & loss accounts, and balance sheets.
- Develop the ability to prepare and interpret basic financial statements to assess an organization's financial health.

<b>Course Content</b>	<b>TEACHING HOURS</b>
<b>UNIT 1:</b>	<b>12- Hrs</b>
Evolution of Management: - Contribution of Taylor, Mayo & Fayol, Different approaches of management, role of manager, tasks of a professional manager, Management & its functions. Level of Management, managerial skills at various levels. Planning & Decision making: - Definition, Nature for planning, importance, Process of planning, decision making, nature importance & process, types of plans	
<b>UNIT 2: Probability, Counting, and Relations</b>	<b>12- Hrs</b>
Accounting, meaning, definition, objectives, accounting principles, branches of accounting, uses & limitations of Accounting, Basic Accounting Procedure –, rules of debit & credit, Practical system of book keeping – Cashbook, types of cash book, Profit & loss Account – meaning, Need & preparation, Balance Sheet-Meaning, need & Preparation,	
<b>Reference Books</b>	
<ul style="list-style-type: none"><li>• Principles &amp; Practice of Management – L. M. Prasad</li><li>• Management – Theory &amp; Practice – C. B. Gupta</li><li>• Basics of Accounting – Jain &amp; Narang</li><li>• Basic of Accounting – T. S. Grewal</li></ul>	
<b>COURSE OUTCOMES (CO):</b>	
<b>CO1</b> Students will be able to explain the contributions of Taylor, Mayo, and Fayol to modern	

management theories and how these have shaped contemporary management practices.

**CO2:** Students will be able to define, plan, and implement effective organizational strategies.

**CO3:** Students will demonstrate a clear understanding of accounting principles and procedures, applying them to maintain accurate financial records.

**CO4:** Students will gain proficiency in preparing key financial documents, such as cashbooks, profit & loss accounts, and balance sheets..