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:	https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Custom/Updated%20Syllabus%20MCA_2021.pdf

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. Multimedia Systems
            2. Wireless & Mobile Computing

List of New Courses introduced since 2019:

Course Code	Course Title	Programme	Brief Description
MCA18004CR	Multimedia Systems	MCA	To introduce various aspects of multimedia components like Images, audio, sound and computer graphics
MCA21306DCE	Wireless & Mobile Computing	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 2019.	https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Custom/Doc11233.pdf		

Dates of syllabus revisions during the last five years. (2019-2023)	2018	2019	2020	2021

Departmental website link in support of syllabus revisions.	https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Custom/BOS%2025-9-2020.pdf

Are Programme Outcomes (POs) clearly mentioned in the syllabus? (Y/N) Y https://cs.uok.edu.in/Main/ViewPage.aspx?Page=Programme_Outcome	
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 **https://cs.uok.edu.in/Files/79755f07-9550-4aebbd6f5d802d56b46d/Menu/Programme_Relevance_a9db5414-ffe1-47c2-bd74-a65248fb1351.pdf**	

List of courses addressing **Local Needs:**

Course Code	Course Title	Brief Justification
MCA21102CR	Database Systems	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	Artificial Intelligence	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	Python	Offering foundational programming skills that are essential for careers in software development, data analysis, and automation.

Empowering students to create dynamic websites, paving the way for careers in web development and digital entrepreneurship |

MCA21205DCE	Web Programming	

Course Code	*Course Title*	*Brief Justification*
MCA21102CR	Database Systems	Enabling efficient data management for local governance, healthcare, and educational institutions, improving service delivery

Course Code	*Course Title*	*Brief Justification*
MCA21304CR	Machine Learning	Driving innovation in agriculture and disaster management by applying predictive models to local environmental and economic challenges
MCA21204CR	Software Engineering	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

Course Code	*Course Title*	*Brief Justification*
MCA21207DCE	Computer Graphics and Multimedia	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	Machine Learning	Addressing global challenges in areas like climate change, healthcare, and cybersecurity through advanced predictive analytics and automation
MCA21205DCE	Web Programming	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:

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

Course Code	Course Title	Brief Justification
MCA21205DCE	Web Programming	Web Programming secures opportunities as a Web Developer or Front-End Engineer in digital agencies, e-commerce companies, and technology firms
MCA21103CR	Computer Networks	Equips one with the skills to design, manage, and secure networks, essential for roles in IT infrastructure.

List of Entrepreneurship Development Courses:

Course Code	Course Title	Brief Justification
MCA21307DCE	ORGANISATIONAL BEHIOUR	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."

MCA21104CR	ACCOUNTING AND MANAGEMENT CONTROL	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:**

Course Code	Course Title	Brief Justification
MCA21102CR	Database Systems	Database Systems as a skill development course equips you to manage and analyze data efficiently, essential for roles in IT, finance, and healthcare
MCA21304CR	Machine Learning	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	Python	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:**

Course Code	Course Title	Brief Justification

MCA21307DCE	ORGANISATIONAL BEHAVIOUR	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 **Gender Issues:**

Course Code	Course Title	Brief Justification

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 Human Value Issues:

Course Code	Course Title	Brief Justification
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 Environment Issues:

Course Code	Course Title	Brief Justification
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 Sustainability issues:

Course Code	Course Title	Brief Justification
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 Other Value Framework enshrined in NEP2020/etc.:

Course Code	Course Title	Brief Justification

MCA21301CR	Design and Analysis Algorithms	Design and Analysis of Algorithms promote logical thinking and problem-solving, essential values for innovation and efficient resource management.
MCA21303CR	Operating Systems	Operating Systems instill the value of system efficiency and reliability, crucial for maintaining stable and secure technological environments
MCA21204CR	Software Engineering	Software Engineering embodies the values of teamwork, quality assurance, and ethical re sponsibility, 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)

Programme Code	Name of Diploma Programme	Mode of Programme (Online/Offline)	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
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)

Course Code	Name of Certificate Course	Mode of Course (Online/Offline)	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
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 Value-Added Courses? (Y/N) N

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)

Course Code	Name of Value Added Course	Mode of Course (Online/Offline)	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
MCA24001OE	Digital & Technological Solutions	Offline	2024	28	3	-	https://cs.uok.edu.in/Files/79755f07-9550-4aebbd6f-5d802d56b46d/Menu/New_Doc_10-01-2024_10_6113df29-fc08-4645-9155-a7ec003798d6.pdf	2024

Does the Department/Directorate/Institute/ Centre offer Online Courses of MOOCs, SWAYAM/e-PG Pathshala/ NPTEL and other recognized platforms? (Y/N)	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	Design and Analysis of Algorithms	SWAYAM 2	2020-2023	48 hours	N/A	8883	https://onlinecourses.swayam2.ac.in/cec20_cs03/preview	

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	https://cs.uok.edu.in/Files/79755f07-9550-4aeb-bd6f-5d802d56b46d/Alert/Project_Allocation_1995a35e-7caa-44e1b55cc811895f6a2a.pdf
MCA21402CR	Project Problem Analysis	4		
MCA21403CR	Project Dissertation	6		
MCA21404DCE	Project In-Home Software Development	4		
MCA21405DCE	Project - In-Home Research Component	4		
MCA21406DCE	Project Industrial Software Development	4		

| MCA21407DCE | Project Industrial Research Component | 4 | | |

Any other Relevant Information:

COURSE TITLE: Computer Graphics and Multimedia

Course Code		: MCA21207DCE		Examination Scheme		
Total number of Lecture Hours: 40				**External**		**80**
				Internal		**20**
Lecture (L):	**3**	**Practical(P):**	**2**	**Tutorial (T):**	**0**	**Total Credits**	**4**

Course Objectives:
- **Understand Computer Graphics Principles:** Grasp the fundamental concepts and applications of computer graphics, including graphic display devices and 2D/3D transformations.
- **Implement Graphics Algorithms:** Develop skills in essential graphics algorithms such as line and circle drawing, clipping, filling, and hidden surface removal.
- **Work with Curves and Surfaces:** Apply mathematical techniques for curves and surfaces, including spline and Bezier methods, for creating complex graphical models.
- **Integrate Multimedia Elements:** Learn about multimedia concepts, file formats, and storage solutions to create and manage multimedia content effectively. Introductory concepts of AR &VR technologies.

Course Content	TEACHING HOURS
UNIT 1: Unit Heading	**10Hrs**
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.	
UNIT 2: Unit Heading	**10Hrs**
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)	
UNIT 3: Unit Heading	**10Hrs**
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)	
UNIT 4: Unit Heading	**10Hrs**
Curves and Surfaces: Spline specification, Interpolated& Approximated Splines. spline representation, cubic spline interpolation methods, Bezier Splines, Bezier Curves, Cubic Bezier Curves, Bezier Surfaces. (3LIntroduction to multimedia elements: Images (BMP, PCX), sound (WAV, MP3) Multimedia storage formats: CDs and DVDs).	

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Lab Manual

Lab Sheet 1 Unit I:

Q1. Write a C++ program to draw line.

Q2. Write a C++ program to draw circle.

Q3. Write a C++ program to draw pixel.

Lab Sheet 2 Unit I:

   Q1. Write a C++ program to draw line using DDA algorithm.

Q2. Write a C++ program to implement Brenham's algorithm to draw line.

Lab Sheet 3 Unit I:

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.

Lab Sheet 1 Unit II:

Q1. Write a program to apply Translation to 2D shapes

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:

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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 Frogers 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.

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COURSE TITLE: Wireless and Mobile Communication

Course Code		: MCA21306DCE	Examination Scheme	
Total number of Lecture Hours: 48			**External**	**80**
			Internal	**20**

Lecture (L):	3	Practical(P):	0	Tutorial (T):	1	Total Credits	4

Course Objectives:
- Learn the classification and types of wireless telephones including Cordless, Fixed Wireless (WLL), Wireless with limited mobility (WLL-M), and Fully Mobile Wireless phones.
- Understand the concept of cells, sectorization, coverage area, frequency reuse, and cellular networks.
- Learn the purpose and functionality of various channels such as Pilot, Sync, Paging, Forward Traffic Channels, Access Channels, and Reverse Traffic Channels.
- 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).
- Explore different handoff scenarios within the GSM network.

Course Content	TEACHING HOURS
UNIT 1:	**12 Hrs**
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. MobileOriginated vs. Mobile-Terminated calls. Mobile Phone numbers vs. Fixed-Phone numbers	
UNIT 2:	**12 Hrs**
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 chipsequence.	
UNIT 3:	**12 Hrs**
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.	
UNIT 4:	**12 Hrs**
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.	

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Tutorial

Unit I

Tutorial 1

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

Q2. Name and briefly describe three technologies used by second-generation mobile networks and indicate the bandwidth of the channel used by each one.

Q3. Explain the concept of a cell, coverage area and sectorization.

Tutorial 2

Q1 Draw a diagram showing the positioning of wireless networks vis – a - vis wired network.

Q2 Why are wired +network usually part of the wireless infrastructure?

Q3 Differentiate between Portability, nomadicity and mobility

Tutorial 3

Q1 Name three channel sounding techniques, Give the advantages and disadvantages of each. Q2 What are the three important radio propagation phenomena at high frequencies? Which of them is predominant indoors

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 secyor 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

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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 reasone why it is difficult to dwtect collusions 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 thr 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.Andy 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.

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COURSE TITLE: Database Systems

Course Code:		MCA21102CR				Examination Scheme	
Total number of Lecture Hours: 48						External	80
						Internal	20
Lecture (L):	3	Practicals(P):	2	Tutorial (T):	0	Total Credits	4

Course Objectives

- 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.
- Describe data models, schemas, and instances, and compare various database models. Understand the Three Schema Architecture, data independence, database languages, interfaces, and DBMS classifications.
- Gain an overview of data modeling and create entity-relationship (ER) models to represent data structures and relationships effectively.
- 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.
- 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.
- 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.

Course Content	TEACHING HOURS
UNIT 1: Introduction to Database Systems	**12 Hrs**
Introduction to Data, Information and Knowledge. Database basics – Need and evolution, Database and DBMS. Characteristics of Database Approach, Advantages and disadvantages of DBMS Approach. 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. Data Modeling: Overview of Data Modeling, Entity-Relationship (ER) Modeling.	
UNIT 2: Relational Data Model and Database Design	**12 Hrs**

Relational Data Model –Basic Concepts and Characteristics, Model Notation, Model Constraints and Database Schemas, Constraint Violations Relational Algebra – basic concepts, Unary Relational Operations, Algebra Operations from Set Theory, Binary Operations, Additional Relational Operations Criterion for Good Database Design. Database Design through Functional Dependencies & Normalization: Functional Dependencies, Lossless Join, Normal Forms: 1NF, 2NF, 3NF, BCNF.	
UNIT 3: SQL and Advanced Data Definition	**12 Hrs**
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.	
UNIT 4: Transaction Processing and Database Recovery	**12 Hrs**
Transaction Processing –Transaction Processing Basics, Concurrency Control, Transaction and Systems Concepts, Desirable properties of Transactions. Characterizing Schedules and Recoverability, Schedules and Serializability. Concurrency Control - Two Phase Locking, Timestamp Ordering. Database Recovery – Concepts, Transaction Rollback, Recovery based on Deferred and Immediate Update, Shadow Paging	

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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.

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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->B and C->D. Check the decomposition of R into R1(AB) and R2(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->B, B->CD

2.   A->B, B->C, C->D

3.   AB->C, C->AD

4.   A ->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 attributesandperformthefollowingoperations? 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?

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- 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 10records inthetable.
- 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	Varchar2	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	Varchar2	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

a. 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.

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- 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.

b. 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

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

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

Attribute Name	ST_ROLLNO	ST_NAME	ST_ADDRSS
Date Type	Number	Varchar2	Varchar
Size	6	30	35
Constraint	Primary/UniqueKeys	NotNULL	NOTNULL

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

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

Attribute Name	DID	NAME	Address
Date Type	Number	Varchar2	Varchar
Size	4	30	100
Constraint	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

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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 Relational Database 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.

COURSE TITLE: Artificial Intelligence

Course Code: MCA21203CR		Examination Scheme	
Total number of Lecture Hours:		**External**	**80**
		Internal	**20**

Lecture (L):	**3**	**Practicals(P):**	**2**	**Tutorial (T):**	**0**	**Total Credits**	**4**

Course Objectives

- To present an overview of artificial intelligence (AI) principles and approaches .
- To develop a basic understanding of the building blocks of AI as presented in terms of Knowledge representation, inference, logic, and learning.
- To have understating of different search problems and their solution using various algorithms
    - To have basic understanding of role of AI and ML along with IOT, expert systems

Course Content	TEACHING HOURS
UNIT 1:	**10-Hrs**
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	
UNIT 2:	**10-Hrs**
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.	
UNIT 3:	**10-Hrs**
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	
UNIT 4:	**10 Hrs**
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	

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Lab Manual

Unit I

Lab Sheet 1

1. Build an expert system and demonstrate forward chaining inferencing.

Lab Sheet 2

1. Build an expert system and demonstrate backward chaining inferencing.

Lab Sheet 3

1. Build an expert system and demonstrate conflict resolution process. **Unit II**

Lab Sheet 1

1. Build a Fuzzy inference system for the Tipping Problem

Lab Sheet 2

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

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COURSE TITLE: Web Programming

Course Code: MCA21205DCE			Examination Scheme	
Total number of Lecture Hours: 48			External	80
			Internal	20
Lecture (L):	**3**	**Practicals(P): 2**	**Tutorial (T):**	**Total Credits**	**4**

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.

Course Content	TEACHING HOURS
UNIT 1:	**-Hrs**
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
UNIT 2:	**- Hrs**
Style Sheets: Different approaches to style sheets, Using Multiple approaches, Linking to style information in s separate file, Setting up style information. 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,	12

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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.	
UNIT 3:	**-Hrs**
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) 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	12
UNIT 4:	**-Hrs**
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.	12

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Lab Manual

Unit I

Week 1:

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.

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 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

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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 armstong 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. Wite 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 year3. 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 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 Duckett

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):

CO1: HTML and XHTML Proficiency: Students will be able to create well-structured HTML and XHTML documents, utilizing semantic elements and multimedia integration.

CO2: CSS Styling and Layout: Students will demonstrate the ability to apply CSS for styling web pages, including advanced techniques like Flexbox and Grid layouts.

CO3: JavaScript Development: Students will be able to write JavaScript code to handle user interactions, manipulate the DOM, and implement AJAX for asynchronous data fetching.

CO4: PHP and Form Handling: Students will be proficient in writing PHP scripts for server-side processing, form handling, and user input validation.

CO5: Database Operations: Students will be able to connect web applications to MySQL databases, perform CRUD operations, and manage data securely.

CO6: Complete Web Application Development: Students will be capable of developing and deploying full-stack web applications that integrate HTML, CSS, JavaScript, PHP, and MySQL.

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Machine Learning

Course Code:				MCA21304CR		Examination Scheme	
Total number of Lecture Hours:24 Hrs						**External**	**40**
						Internal	**10**
Lecture (L):2	**-**	**Practicals(P):**	**-**	**Tutorial (T):**	**-**	**Total Credits**	**2**

Course Objectives

- *To present an overview of Machine Learning(ML) principles and approaches .*
- *To understand pattern clustering and classification algorithms to classify data*
  To understand the Implementation of Support Vector Machine algorithm   *To create new machine learning techniques.*

Course Content	TEACHING HOURS
UNIT 1:	**12-Hrs**
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,	
UNIT 2:	**12Hrs**
Logistic Regression, Support Vector Machines: Binary Linear Support Vector Machines, Optimal Hyperplane, Kernel Functions, Solving Nonlinear Classification problems with Linear Classifier. Applications of Support Vector Machines. Dimensionality Reduction, Principal Component Analysis, Fisher Linear Discriminant, Quadratic Discrminant Analysis, Multiple Discriminant Analysis..	

Textbooks
1. Tom M. Mitchell, "Machine Learning", McGraw-Hill, 2010
2. Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995

Reference Books

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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.

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COURSE TITLE: Computer Networks

Course Code:MCA21103CR				Examination Scheme	
Total number of Lecture Hours:48				**External**	**80**
				Internal	**20**
Lecture (L):3	**-**	**Practical's (P):** **2**	**Tutorial (T):**	**-**	**Total Credits**	**4**

Course Objectives ✓ To gain a comprehensive understanding of the core principles of computer networking, including protocol design, protocol layering, algorithm design, and performance evaluation.
- ✓ 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.
- ✓ To Understand the design issues of the network layer, including various routing algorithms and congestion control mechanisms.
- ✓ To learn about the protocols used in the transport and application layers, including their design and functionality.

Course Content	**TEACHING HOURS**
UNIT 1:	**-12 Hrs**
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.	
UNIT 2:	**12 Hrs**
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.	
UNIT 3:	**12 Hrs**
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.	
UNIT 4:	**12 Hrs**
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.	

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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
Q2. Program that prints all the addresses of 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)

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Textbooks
Andrew Tanenbaum, "Computer Networks", 6th Edition by Pearson, 2022
Reference Books
Behrouz A. Foruzan - Data communication and Networking, 6th edition, TMH, 2022

COURSE OUTCOMES (CO):

Upon successful completion of this course, learners will be able to:

1. **List the functionalities of different layers** in both the OSI and TCP/IP reference models.
2. **Analyze complex networking problems**, including the concepts of internetworking, and the differences between connection-oriented and connection-less approaches.
3. **Describe the principles of switching and routing algorithms** used in computer networks.
4. **Distinguish between TCP and UDP** formats and procedures, understanding their respective uses and characteristics.
5. **Identify, formulate, and analyze complex networking issues**, applying principles and concepts learned throughout the course.

COURSE TITLE: Organizational Behaviour

Course Code: MCA21307DCE		Examination Scheme	
Total number of Lecture Hours: 48		External	80
		Internal	20

Lecture (L):	3	Practicals(P):	-	Tutorial (T):	1	Total Credits	4

Course Objectives

- 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.
- 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.
- Organizational behavior studies the mechanisms governing these interactions, seeking to identify and foster behaviors conducive to the survival and effectiveness of the organization.

Course Content	TEACHING HOURS
UNIT 1:	**12 Hrs**
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.	
UNIT 2:	**12 Hrs**
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	
UNIT 3:	**12 Hrs**
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.	
UNIT 4:	**12 Hrs**

Oganizational 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	

Tutorial

Unit 1

Tutorial 1

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.

Tutorial 2

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

Tutorial 3

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 & its relevance in today's scenario

UNIT 2

Tutorial 1

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.

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 organsational 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.

To be effective from year-2024

COURSE TITLE: Operating System

Course Code: MCA21303CR		Examination Scheme	
Total number of Lecture Hours: 48		External	80
		Internal	20

Lecture (L):	4	Practicals(P):	-	Tutorial (T):	-	Total Credits	4

Course Objectives

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

Course Content	TEACHING HOURS
UNIT 1:	**12 Hrs**
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.	
UNIT 2:	**12 Hrs**
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.	
UNIT 3:	**12 Hrs**
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.	
UNIT 4: Deadlocks	**12 Hrs**
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.	

LAB MANUAL

UNIT I
Lab Sheet 1
1. Write a program to implement process systemcalls.
2. Write a program to implement I/O systemcalls

Lab Sheet 2:

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

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

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 schedulingalgorithm.

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: Python

Course Code: MCA21202CR		Examination Scheme	
Total number of Lab Hours:		**External**	**40**
		Internal	**10**

Lecture (L):	1	Practicals(P):	2	Tutorial (T):	-	Total Credits	2

Course Objectives:

- Develop Proficiency in Python Programming: Equip students with fundamental programming skills in Python, focusing on syntax, control structures, data types, and basic operations.
- 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.
- 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.

Course Content	TEACHING HOURS
Unit I:	**12 Hrs**
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	
Unit II:	**12 Hrs**
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.	
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.

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	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.

Course Content	TEACHING HOURS
UNIT 1: Fundamentals of Software Engineering	**10 Hrs**
Concept and Nature of Software: Concept and Nature of Software, Software Crisis, Software Engineering – Concept, Goals and Challenges, Software Engineering Approach. 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 Software Process and Project Measurement: Measures, Metrics and Indicators, Size -Oriented Metrics vs. Function - Oriented Metrics, Capability Maturity Model Integration (CMMI). COCOMO Model.	
UNIT 2: Requirements Engineering	**10 Hrs**
Introduction to Requirements Engineering - Why, What and Where. Requirements Types: functional and nonfunctional requirements. Requirement Engineering Framework. Requirement Elicitation Process and Techniques. Requirement Analysis and Modelling, Requirements prioritization, verification, and validation.	
UNIT 3: Design Engineering	**10 Hrs**
Basics of Design Engineering - Abstraction, Architecture, Patterns, Separation of concerns, Modularity, Functional Independence, refinement, Refactoring. Function oriented design, Design principles, Coupling and Cohesion, Design Notations & Specifications, Structured Design Methodology. Object-Oriented Design - Design Concepts, Design Methodology, Object-oriented analysis and design modeling using Unified Modeling Language (UML), Dynamic & Functional Modeling, Design Verification.	

UNIT 4: Software Testing and Reliability	10 Hrs
Software Testing – Concepts, Terminology, Testing & 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. Introduction to Software Reliability: Basic Concepts, Correctness Vs Reliability, Software Reliability metrics, Operational Profile, Reliability Estimation and Predication, Reliability and Testing. Concept of Software reengineering, reverse engineering and change management.	

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. Ientify 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. Draw the collaboration diagram as per the norms

vii. Identify various elements such as different activity their boundaries etc. of the activity diagram. Draw the activity diagram. viii. Identify various elements of the component diagram such as the various components like client, server, network elements etc. Draw the component diagram. ix. Identify various elements such as the hardware components of the deployment **diagram.**

Draw the deployment diagram.

UNIT IV Tutorial

#1

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.

Tutorial #2

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.

Tutorial #3

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.

Textbooks

1. Pfleeger and Atlee, Software Engineering: Theory and Practice, 4th Edition, Pearson, 2010

Reference Books

2. Sommmerville, Ian - Software Engineering. Pearson , 9/e , 2011.
3. Pankaj Jalote - An Integrated approach to Software Engineering, Narosa Publication.
4. Software Engineering: Principles and practice, 3rd Edition, Hans Van Vliet, Wiley.
5. James F. Peters Software Engineering – An Engineering Approach, Wiley& Sons.
6. Roger Pressman, Software Engineering: A Practitioners Approach",McGraw-Hill Publications

COURSE OUTCOMES (CO):

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.

COURSE TITLE: Management Information Systems

Course Code: MCA21401OE		Examination Scheme	
Total number of Lecture Hours: 20		**External**	**40**
		Internal	**10**

Lecture (L):	2	Practicals(P):	-	Tutorial (T):	-	Total Credits	2

Course Objectives

- 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.
- 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.

Course Content	TEACHING HOURS
UNIT 1:	**10 Hrs**
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.	
UNIT 2:	**10 Hrs**
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 8th 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

To be effective from year-2024

COURSE TITLE: Accounting and Management Control

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

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.

Course Content	TEACHING HOURS
UNIT 1:	**12- Hrs**
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	
UNIT 2: Probability, Counting, and Relations	**12- Hrs**
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,	

Reference Books

- Principles & Practice of Management – L. M. Prasad
- Management – Theory & Practice – C. B. Gupta
- Basics of Accounting – Jain & Narang
- Basic of Accounting – T. S. Grewal

COURSE OUTCOMES (CO):

CO1 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..

COURSE TITLE: Social Justice and Human Rights						
Course Code:					**Examination Scheme**	
Total number of Lecture Hours: 60					External	80
					Internal	20
Lecture (L):		**Practicals(P):**	**Tutorial (T):**	**-**	**Total Credits**	**4**

Course Objectives

- *To develop in learner, the critical understanding of Social Justice and its linkage with development issues.*
- *To develop in learner an appreciation of the relevance of social justice to social work practice.*

Course Content	TEACHING HOURS
UNIT- I: Social Justice	**15- Hrs**
• Social Justice: Concept & Definition • Theories of Justice, John Rawls, John Stuart Mill, Marx, Amratya sen, • Social justice & Indian Constitution- Fundamental rights & Directive principle	
UNIT -II: Social Legislation and Social Change	**15- Hrs**
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, Social Legislation: Meaning and Scope, Public Interest Litigation, Legal aid. • Fundamental rights and Social legislation, NFS Act, 2013.	
UNIT-III: Human Rights and Law	**15- Hrs**
• Concept of Human Rights. • UN Declaration of Human Rights • National Human Rights Commission-Composition, Function and role	
UNIT –IV: Human Rights with reference to special groups (Indian context)	**15- Hrs**
• Rights-based Approach and Social Work. • Human rights and vulnerable groups. (Minorities, SC/ST) Human rights concerns of victims of Conflict and violence.	

Suggested Readings:

1. Gangrade, K. D. (2011). *Social legislation in India*. New Delhi: Concept Publishing Company (P) Ltd.

2. Hasnain, N. (1998). *Weaker Sections: Psychosocial Perspectives*. New Delhi: Gyan Publishing House.

3. Ife, Jim. (2001).*Human Rights and Social Work- Towards a Rights-Based Practice*. Cambridge University

   Press.

4. Mohapatra, A. R. (2001). *Public interest litigation and human rights in India*. New Delhi: Radha publications. 5. Nirmal, C. J. (1999). *Human rights in India – historical, social and political perspectives*. Delhi: Oxford University.

6. Nirmal, C. J. (2000). *Human Rights in India-Historical, Social and Political Perspectives*. London: Oxford University Press.

7. Pine, Rachel.(1995).*The Legal Approach: Women's Rights as Human Rights. (N.D)*.

8. Rawls, J. (1971). *A theory of justice*. Cambridge, MA: Belknap Press.

9. Sen, A. (2009). *The idea of justice*. Cambridge, Mass: Belknap Press of Harvard University Press.

10. Singh, A. K. (2014). *Human rights and social justice*. VL Media Solutions, India.

11. The Universal Declaration of Human Rights of the United Nations.

Web links:

1. Human Rights and Social Justice available at file:///C:/Users/user%205/Downloads/laws-06- 00007.pdf

2. Meckled- Garcia.S , (N.D). Human rights or social justice? Rescuing human rights from the outcomes https://www.ucl.ac.uk/political-science/publications/downloads/SPP_WP_30_ Saladin_MeckledGarcia.pdf.

3. The International Forum for Social Development ,Social Justice in an Open World The Role of the United Nations (N.D). http://www.un.org/esa/socdev/documents/ifsd/SocialJustice.pdf.

COURSE TITLE: Human, Environment and Development						
Course Code: ENS18107DCE				**Examination Scheme**		
Total number of Lecture Hours: 24				**External**		**40**
				Internal		**10**
Lecture (L):	**2**	**Practicals(P):**	**Tutorial (T):**	**-**	**Total Credits**	**2**

Course Objectives

In this course students will learn about proximate drivers of economy's and life style change impact on environmental quality. Further they will get familiar with the role of various stake holders in protecting the quality of environment from further degradation. This paper takes the students to social thought on environmental issues from a historical and contemporary perspective.

Course Content	TEACHING HOURS
Unit I: Environmentalism	**12- Hrs**
1.1. Environmentalism: Concept and history 1.2. Environmental organizations (WWF, UNEP, IUCN, WHO) 1.3. Environmental justice 1.4. The monetization frontier 1.5. Environmental politics	
Unit II: Environmental education	**12- Hrs**
1.1. Environmental education: Aims, objectives and principles 1.2. Environmental protection and religious teachings 1.3. Environmental literacy and activism 1.4. Environmental ethics 1.5. Environmental policy and public attitude	
Reference Books	
•	

COURSE TITLE: Basics of Ecology and Environment

Course Code: ENS17GE01		Examination Scheme	
Total number of Lecture Hours: 24		**External**	**40**
		Internal	**10**
Lecture (L): 2	**Practicals(P):**	**Tutorial (T):**	**-**	**Total Credits**	**2**

Course Objectives

In this course students will learn about proximate drivers of economy's and life style change impact on environmental quality. Further they will get familiar with the role of various stake holders in protecting the quality of environment from further degradation. This paper takes the students to social thought on environmental issues from a historical and contemporary perspective.

Course Content	TEACHING HOURS
Unit I:	**12- Hrs**
1.1 Importance of environment 1.2 Components of environment-Atmosphere, hydrosphere, lithosphere and biosphere 1.3 Human and environment relations 1.4 Environment and development 1.5 Tools for environmental management	
Unit II:	**12- Hrs**
1.1 Structure and functions, 1.2 Natural and managed ecosystem 1.3 Ecosystem goods and services 1.4 Ecological Succession 1.5 Ecological Interactions	
Reference Books	
•	

COURSE TITLE: Environmental Economics and Sustainable Development						
Course Code: ENS18206 DCE					**Examination Scheme**	
Total number of Lecture Hours:					**External**	
					Internal	
Lecture (L):		**Practicals(P):**	**Tutorial (T):**	**-**	**Total Credits**	**4**

Course outcome: In this course students will learn how economic activity depends upon and affects the natural environment. The students will be exposed to the idea and argument that the environment sets the limits to the economic growth thereby setting the context and tone for the emergence of the idea of sustainable development. Further students will also get the understanding of various types of services provided by the nature free of any cost.

Course Content	TEACHING HOURS
Unit I: Environmental economics	**15- Hrs**
1.1. Environmental economics: Definition and scope 1.2. Economic growth versus sustainable development 1.3. Concept of intangibles and externalities 1.4. Environmental evaluation methods: Hedonic pricing, contingent evaluation and Household production function 1.5. Carbon credits and trading	
Unit II: Environment and Development	**15- Hrs**
1.1.Sustainability and pillars of sustainability 1.2.Sustainability and the green footprint 1.3.Sustainable development goals 1.4. World Summit on sustainable development 1.5.World Environment views	
Unit III: Population and Development 1.1.Global population patterns and trends 1.2.Understanding population growth rates 1.3.Population, poverty and resource utilization 1.4.Resource conflicts: Extraction, access and control 1.5.Linkages between environment population and development	**15- Hrs**
Unit IV: Ecosystem Services 1.1.Ecology and Ecosystems: Moving towards sustainability 1.2.Typologies of ecosystem services 1.3.Biodiversity: Engine of ecosystem services 1.4.Valuation and accounting of Ecosystem services 1.5.Incentives for Ecosystem services (IES) in the Himalayas	**15- Hrs**
Reference Books	
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COURSE TITLE: DIGITAL AND TECHNOLOGICAL SOLUTIONS			
Course Code: ENS17GE01		**Examination Scheme**	
Total number of Lecture Hours: 24		**External**	**40**
		Internal	**10**
Lecture (L): 2	**Practicals(P):**	**Tutorial (T):** -	**Total Credits** 2

Course Objectives
- To gain familiarity with digital paradigms.
- To sensitize about the role and significance of digital technology.
- To provide know-how of communications and networks.
- To bring awareness about e-governance and Digital India initiatives.
- To provide a flavor of emerging technologies: Cloud, Big Data, AI, 3D printing.

Course Outcomes:

- Knowledge about digital paradigms.
- Realization of the importance of digital technology, digital financial tools, and e-commerce.
- Know-how of communication and networks.
- Familiarity with e-governance and Digital India initiatives.
- An understanding of uses and applications of digital technology.Basic knowledge of machine learning and big data.

Course Content	TEACHING HOURS
Unit I:	**12- Hrs**
Introduction & Evolution of Digital Systems. Role & Significance of Digital Technology. Information & Communication Technology & Tools. Computer System and its working, software and its types. Operating Systems: Types and Functions. Problem Solving: Algorithms and Flowcharts. Communication Systems: Principles, Model & Transmission Media. Computer Networks & Internet: Concepts & Applications, WWW, Web Browsers, Search Engines, Messaging, Email, Social Networking. Computer-Based Information System: Significance & Types. E-commerce & Digital Marketing: Basic Concepts, Benefits & Challenges.	
Unit II:	**12- Hrs**
Digital India & e-Governance: Initiatives, Infrastructure, Services, and Empowerment. Digital Financial Tools: Unified Payment Interface, Aadhar Enabled Payment System, USSD, Credit/Debit Cards, e-Wallets, Internet Banking, NEFT/RTGS and IMPS, Online Bill Payments and PoS. Cyber Security: Threats, Significance, Challenges, Precautions, Safety Measures & Tools, Legal and Ethical Perspectives. Emerging Technologies & Their Applications: Overview of Cloud Computing, Big Data, Internet of Things, Virtual Reality, Blockchain & Cryptocurrency, Robotics, Machine Learning & Artificial Intelligence, 3-D Printing, Digital Signatures.	
Reference Books	

- V. Rajaraman, *Introduction to Information Technology*, 3rd Edition, PHI.
- E. Balagurusamy, *Fundamentals of Computers*, Tata McGraw Hill.
- Behrouz A. Forouzan, *Data Communications and Networking*, McGraw Hill.
- Pramod Kumar, Anuradha Tomar, R. Sharmila, *Emerging Technologies in Computing: Theory, Practice, and Advances*, Edition 2021, Chapman and Hall/CRC Imprint.
- Buvya, Broberg, and Goscinski, *Cloud Computing: Principles and Paradigms*, Wiley.
- Russell and Norvig, *Artificial Intelligence: A Modern Approach*, Pearson Education.
- Samuel Greengard, *Internet of Things*, MIT Press.
- C. S. V. Murthy, *E-commerce: Concepts, Models, Strategies*.
- Hurwitz, Nugent, Halper, Kaufman, *Big Data for Dummies*, Wiley & Sons.

TEXTBOOK:

- F. S. Masoodi, Z. S. Masoodi, and K. B. Dar, *Digital and Technological Solutions*, BPB Publications.

COURSE TITLE: Design and Analysis of Algorithms

Course Code:			Examination Scheme	
Total number of Lecture Hours:			External	
			Internal	
Lecture (L):	**Practicals(P):**	**Tutorial (T):**	**-**	**Total Credits**	**4**

Course outcome: In this course students will learn how economic activity depends upon and affects the natural environment. The students will be exposed to the idea and argument that the environment sets the limits to the economic growth thereby setting the context and tone for the emergence of the idea of sustainable development. Further students will also get the understanding of various types of services provided by the nature free of any cost.

Course Content	TEACHING HOURS
Unit I:	**15- Hrs**
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)	
Unit II:	**15- Hrs**
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)	
Unit III:	**15- Hrs**
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)	
Unit IV:	**15- Hrs**
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)	

Text Books
• Horowitz, Sahni, Rajasekaran "Fundamentals of Computer Algorithms", Galgotia Publications Reference Books: • Coremen, Leiserson, Rivest,Stein, "Introduction to Algorithms", 2nd edition, PHI.   • Michael T. Goodrich, Roberto Tamassia "Algorithm Design and Applications" , Wiley   • Aho, Hopcroft and Ullman, "The Design and Analysis of Computer Algorithms", Pearson   •

Subject Name: Algorithms Lab

Unit 1:
LabShee
t1:
1.   Write a program for Linear Search.
2.   Implement recursive solution to the Tower of Hanoi puzzle.

LabShee
t2:
1.   Write a program for iterative binary search.
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 > 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.

LabShee
t3:
1.   Print all the nodes reachable from a given starting node in a digraph using BFS method.
2.   Obtain the Topological ordering of vertices in a given digraph

Unit 2:
LabShee
t1:
1.   Write a program for recursive binary search.
2.   Write a program for Merge Sort.

LabShee
t2:
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.

LabShee
t3:
1.   Implement Knapsack Problem using greedy method.
2.   Write a program for Single Source Shortest path algorithm using greedy method.

Unit 3:
LabShee
t1:
1.   Implement 0/1 knapsack using dynamic programming.
2.   Write a program for travelling salesman problem using Dynamic programming.

LabShee
t2:
1.   Implement BFS.
2.   Implement DFS.

LabShee
t3:
   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:
LabShee
t1:

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

LabShee
t2:

1. Design and implement in C to find a subset of a given set S = {Sl, S2,.....,Sn} 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.

LabShee
t3:

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