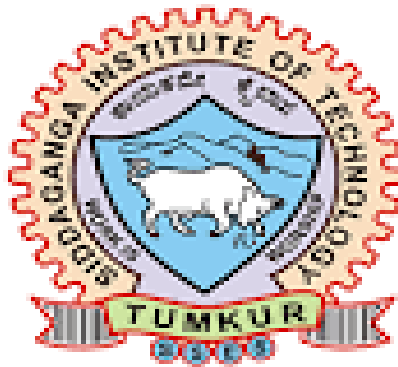


Siddaganga Institute of Technology-Tumakuru

Department of Master of Computer Applications



SCHEME & SYLLABUS (I & II Semester)

2024-2026

VISION STATEMENT

“To effectively mould quality and responsible Computer Professionals, with a mind of service and spirituality for nurturing the technological competence”

MISSION STATEMENT

“Imparting quality education to students to make them professionals in their domain replete with IT and computational skills par excellence”

Program Educational Objectives

- PEO 1** *Pursue career in computer applications domain by developing abilities that are in synchrony with changing needs of Industry or academia*
- PEO 2** *Demonstrate professionalism when working with teams and align with ethical principles.*
- PEO 3** *Engage in lifelong learning to upgrade the professional skills*

Program Outcomes (POs)

- PO1: (Foundation Knowledge): Apply knowledge of mathematics, programming logic and coding fundamentals for solution architecture and problem solving.
- PO2: (Problem Analysis): Identify, review, formulate and analyse problems for primarily focusing on customer requirements using critical thinking frameworks.
- PO3: (Development of Solutions): Design, develop and investigate problems with as an innovative approach for solutions incorporating ESG/SDG goals.
- PO4: (Modern Tool Usage): Select, adapt and apply modern computational tools such as development of algorithms with an understanding of the limitations including human biases.
- PO5: (Individual and Teamwork): Function and communicate effectively as an individual or a team leader in diverse and multidisciplinary groups. Use methodologies such as agile.
- PO6: (Project Management and Finance): Use the principles of project management such as scheduling, work breakdown structure and be conversant with the principles of Finance for profitable project management.
- PO7: (Ethics): Commit to professional ethics in managing software projects with financial aspects. Learn to use new technologies for cyber security and insulate customers from malware
- PO8: (Life-long learning): Change management skills and the ability to learn, keep up with contemporary technologies and ways of working.

Master of Computer Applications (MCA) Scheme of Teaching and Examinations – 2024											
I SEMESTER											
Sl. No	Course	Course Code	Course Title	Teaching Hours per Week			Examination				Credits
				Theory	Practical	SDA / Tutorial	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	P						
1	BSC	S1MC01	Mathematical Foundations for Computer Applications	03	-	02	3	50	50	100	4
2	PCC	S1MC02	Web Technologies	03	-	02	3	50	50	100	4
3	PCC	S1MC03	Java Programming	03	-	02	3	50	50	100	4
4	PCC	S1MC04	Computer Networks	03	-	-	3	50	50	100	3
5	IPCC	S1MCI01	Data Structures	03	02	-	4	50	50	100	4
6	PCCL	S1MCL1	Web Technologies Lab with Mini Project	--	03	--	3	50	50	100	1.5
7	PCCL	S1MCL2	Java Lab	--	03	--	3	50	50	100	1.5
8	AEC	S1ARAS	Aptitude Related Analytical Skills	36 hrs. during the entire semester				100		100	PP/NP
9	NCMC	S1NCOP	Mathematics for MCA Students	03	--	--	3	100	-	100	PP/NP
10	NCMC	S1NCMC	Research Methodology and IPR	02	-	-	2	100	-	100	PP/NP
Total				20	08	06	27	650	350	1000	22
Note: BSC-Basic Science Courses, PCC: Professional core. IPCC-Integrated Professional Core Courses, PCCL: Professional Core Courses Lab, AEC –Audit Course / Ability Enhancement Course, PP-Passing is Mandatory, SDA-Tutorial / Skill Development Activities (Hours are for Interaction between faculty and students), NCMC : Non-Credit Mandatory Course											

Bridge Course: NCMC : S1NCOP-Mathematics for MCA Students: Students who have not taken Mathematics at the 10+2 or degree level are required to study and pass this course in the 1st semester. However, this course/subject will not be considered for vertical progression.

Master of Computer Applications (MCA) Scheme of Teaching and Examinations – 2024

II SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Hours per Week			Examination				Credits
				Theory	Practical / Seminar	SDA / Tutorial	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	S2MC01	Database Systems	03		02	03	50	50	100	4
2	IPCC	S2MCI01	Advanced Web Technologies	03	02		03	50	50	100	4
3	PCC	S2MC02	Software Engineering and Project Management	03			03	50	50	100	3
4	PEC	S2MCAX	Specialization A	03			03	50	50	100	3
5	PCCL	S2MCL1	Database Lab		03		03	50	50	100	1.5
6	PCCL	S2MCL2	Python and Data Analytics Lab		03	02	03	50	50	100	2.5
7	NCMC	S2MCSS	Soft Skills	36 Hrs. for the entire semester				100	--	100	PP/NP
8	NCMC	S2NCMC	Ability Enhancement Courses and Seminar -1					100		100	PP/NP
Total				12	08	04	18	500	300	800	18
Note PCC: Professional Core Courses, PEC: Professional Elective Courses, IPCC-Integrated Professional Core Courses. PCCL: Professional Core Courses Lab Ability Enhancement Courses with Seminar-I - None Credit Mandatory Course (NCMC), Students have to select the Topic like ERP, R Programming, Scripting language, Web Development Application, etc. They have to develop a small prototype and demonstrate to all the class.											

Specialization A	
Course Code	Course Title
S2MCA1	Block Chain Technologies
S2MCA2	Cyber Security
S2MCA3	Internet of Things with Cloud

Mathematical Foundations for Computer Applications

Contact Hours/Week	:	03+02(L+T)	Credits	:	04
Total Lecture Hours	:	40	CIE Marks	:	50
Total Tutorial Hours	:	26	SEE Marks	:	50
Course Code	:	S1MC01	Course	:	BSC

Course Objectives:

This Course will enable students to:	
1.	Familiarize the notation and concepts of combinatorial mathematics such as sets and relations.
2.	Identify types of graphs, outline properties of graphs.
3.	Understand the basics of data, Frequency Distributions, Central tendency measures and dispersion.
4.	Learn types of probability, axioms, and Bayes Theorem.

UNIT – I	08 Hours
Basic Structures: Sets, Set operations, Algebra of Sets, Partitions and Duality, Principle of Inclusion and Exclusion, Pigeonhole principle.	

UNIT – II	08 Hours
Relations Relations, Properties of Relations, Computer Recognition- Zero-One Matrices and Digraphs, Partial order relation -Poset and Hasse-Diagrams, Equivalence Relation and Partitions, Extremal elements of a Poset, Lattice.	

UNIT – III	08 Hours
Introduction to Graph Theory: Definitions and Examples, Subgraphs, Complements, and Graph Isomorphism, Vertex Degree, Euler Trails and Circuits, Planar Graphs, Hamilton Paths and Cycles.	

UNIT – IV	08 Hours
Statistics: Introduction to Statistics, classification of variables, types of data, data collection and sampling methods, data representation- diagrammatic methods (line diagram, bar diagram, pie chart), graphical methods (Histogram, frequency polygon, frequency curve, ogive). Measure of central tendency- mean, median, mode, quartiles, harmonic mean and geometric mean. Measure of dispersion- mean deviation, quartile deviation, standard deviation and coefficient of variation.	

UNIT – V	08 Hours
Probability: Basic terminology, Definition of probability, Probability and set notations, Types of events, Addition law of probability, conditional probability, multiplication law of probability, Baye's theorem.	

TEXT BOOKS:

1.	RALPH P. GRIMALDI, "Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education, 2012. ISBN 9780201726343.
2.	SC GUPTA, Fundamentals of Statistics, 7 th Edition, Himalaya Publisher, 2018, ISBN: 9350517698
3.	DOUGLAS C. MONTGOMERY and GEORGE C. RUNGER, Applied Statistics and Probability for Engineers, 7 th Edition, Wiley, 2018, ISBN 978-1-119-40036-3.

REFERENCE BOOKS:

1.	Ralph P Grimaldi, B V Ramana: Discrete and Combinatorial Mathematics, 5 th Edition, PEARSON, 2004.
2.	Kenneth H Rosen: Discrete mathematics and Its Applications, 5th Edition, TATA McGRAW-HILL, 2003.
3.	B S Grewal: Higher Engineering Mathematics, 43 rd Edition, Khanna Publishers. 2017.

WEB LINKS:

1.	https://archive.nptel.ac.in/courses/111/106/111106086/
2.	https://onlinecourses.nptel.ac.in/noc20_cs82/preview
3.	https://learn.careers360.com/maths/sets-relations-and-functions-chapter/
4.	https://www.javatpoint.com/discrete-mathematics-tutorial

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	<i>Apply</i> the fundamentals of combinatorics to solve the real world problems.
CO2	<i>Apply</i> the concept of relations to solve the real world problems.
CO3	<i>Recognize</i> types of graphs, outline properties of graphs and apply Graph theory tools in solving real world problems.
CO4	<i>Acquire</i> ability to represent the data and calculate the measures of central tendency and dispersion.
CO5	<i>Apply</i> the concept of probability for real world problems with uncertainty.

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	3	1						
	CO2	3	1						
	CO3	3	1						
	CO4	3	1						
	CO5	3	1						

1: Low, 2: Medium, 3: High

Web Technologies

Contact Hours/Week	:	03+02(L+T)	Credits	:	04
Total Lecture Hours	:	40	CIE Marks	:	50
Total Tutorial Hours	:	26	SEE Marks	:	50
Course Code	:	S1MC02	Course	PCC	

Course Objectives:

This Course will enable students to:	
1	Understanding the basic concepts of Web page development by using HTML and CSS.
2	Implement web applications for varied window sized devices by using Bootstrap features.
3	Interpret and implement client side validations by using JavaScript code.
4	Interpret and implement the fundamentals of Express.js for building web servers, integrate MongoDB with Node.js for NoSQL data management
5	Interpret and implement the fundamentals of Node.js and module management

UNIT- I	08Hours
Web Basics : Web Applications in Comparison to Desktop Applications, Static Web sites versus Dynamic Web sites, Internet Protocols. Http: Hypertext Transfer Protocol, Headers, Request Methods, Response Codes. HTML: HTML syntax – elements & attributes, nesting HTML elements, structure of HTML documents - DOCTYPE, head & body, headings, paragraphs & divisions, links, URL relative referencing, inline text element, images, character entities, lists HTML5: semantic structure elements, header & footer, heading groups, navigation, articles, figure & figure captions. CSS: Introduction, basic syntax and structure, Box Model, In-line Styles, Embedding Style Sheets, Linking External Style Sheets, Backgrounds, manipulating text, Positioning using CSS.	

UNIT- II	08Hours
HTML Tables and Forms: Basic table structure, spanning rows, columns, additional table elements, styling tables – borders, boxes, zebras, Introducing Forms: Form structure, how forms work, query settings, Form – control elements: Text input controls, choice controls, button controls, specialized controls, date and time controls, Accessible tables, forms Bootstrap: Mobile-first design, Significance of Bootstrap, Including Bootstrap in your HTML file, The Bootstrap CDN, Overriding with custom CSS, Using the Bootstrap customizer, Deep customization of Bootstrap, Downloading the Bootstrap source code, using the Bootstrap Grid- using the Bootstrap Grid classes, Customizing the grid for small devices, Adding offsets to columns, Pulling and pushing columns, Nesting columns, Using LESS with Bootstrap, Customize and extend Bootstrap with <u>LESS</u> , a CSS preprocessor, to take advantage of the variables, mixins, and more used to build Bootstrap's CSS.	

UNIT– III	08Hours
JavaScript: Client-Side Scripting, The Client-Server Model, The Request-Response Loop, Asynchronous data requests. Inline JavaScript, embedded javascript, external javascript, advanced inclusion of javascript. Syntax: Variables, comparison operators, logical operators, conditionals, loops, functions, Errors using Try and catch, JavaScript objects: constructors, properties, objects included in javascript, window object. Document Object Model (DOM): Node, document object, element node object, modifying DOM element. Additional properties JavaScript Events: Inline event handler approach, listener approach, event objects, event types. Forms: Validating forms, submitting forms	

UNIT– IV	08Hours
Introduction to Node.js: Introduction to node.js, features of node.js, Usages node.js, download and install node.js, running first node.js application, modules in node.js, creating NPM modules, extending modules, publishing NPM modules.	

UNIT– V	07 Hours
Node.js with Express Basics of Express.js, installing and using Express, routes, sample web server using Express.js Node.js with MongoDB Node.js and NoSQL databases, Using MongoDB and Node.js, building a Node Express app with MongoDB to store and serve content. Promises: Generator, Event and Filestream, usages of promises, Callback to promises, File streams in Node.js, Emitting events.	

TEXTBOOKS:

1.	Fundamentals of Web Development by Randy Connolly, 3 rd Edition, Pearson Edition-2021, ISBN 10: 1292057092, ISBN 13: 978-1-29-205709-5.
2.	Learn Java for Web Development by Vishal layka, Apress edition-2014, ISBN-13 (pbk): 978-1-4302-5983-1, ISBN-13 (electronic): 978-1-4302-5984-8.
3.	BOOTSTRAPPING doing more with LESS by Sramana Mitra, Publisher: Hachette Book Publishing India Pvt Ltd, 1 st edition 2009, ISBN: 9789380143125, 9789380143125
4.	Begin Node.js by Basarat Ali syed, Publisher: Apress/KP 1 st edition-2019, ISBN-13 (pbk): 978-1-4842-0188-6.
5.	Node.js, MongoDB and Angular Web Development, Brad Dayley, Brendan Dayley, Caleb Dayley Addison Wesley, 2 nd Edition, 2017. ISBN: 9780134656168, 0134656164

REFERENCE BOOKS:

1.	Joelsklar, Principles of web Design,. Published by <u>Cengage</u> , 5 th edition, 2012
2.	Mastering Bootstrap 4, Benjamin Jakobus, Packt, 2016, ISBN:978-1-78398-112-0

WEBLINKS:

1.	https://www.w3schools.com
2.	https://getbootstrap.com/2.0.1/less.html#compiling
3.	https://www.freecodecamp.org/
4.	https://www.nodejs.org and https://expressjs.com
5.	https://www.mongodb.com/docs/

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	<i>Design and develop</i> simple web applications with the HTML elements and CSS features.
CO2	<i>Apply</i> web applications for varied screen sized devices with the usage of Bootstrap features.
CO3	<i>Analyze and adopt</i> client side validations by using Java Script codes.
CO4	<i>Evaluate and apply</i> the core concepts of Node.js <i>identifying</i> appropriate use cases.
CO5	<i>Design and implement</i> a Node.js application using MongoDB for data storage, integrating key concepts of NoSQL databases

Articulation Matrix(Mapping between Cos and Pos)

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	2	2	1	1			
	CO2	2	2	2	1	1			
	CO3	2	2	2	2	1			
	CO4	2	2	2	2	1			
	CO5	2	2	2	2	1			

1: Low, 2: Medium, 3: High

Java Programming

Contact Hours/Week	:	3+2(L+T)	Credits	:	04
Total Lecture Hours	:	40	CIE Marks	:	50
Total Tutorial Hours	:	26	SEE Marks	:	50
Course Code	:	S1MC03	Course	:	PCC

Course Objectives:

This Course will enable students to:	
1.	Comprehend the fundamental concepts of Java environment and Object oriented programming, interpretation of Classes, Objects and the various methods usage.
2.	Interpret and implement Java basic programming with the concepts such as packages, inheritance, interfaces and usage of exceptions and I/O streams.
3.	Interpret and implement of Thread life cycle methods, multi-threading, synchronization and running Applets.
4.	Interpret various Java class types and fundamentals of Networking with Java

UNIT – I	08 Hours
Java Programming Fundamentals: The Java Language, The Key Attributes of Object-Oriented Programming, The Java Development Kit, A First Simple Program, Handling Syntax Errors, The Java Keywords, Identifiers in Java, The Java Class Libraries. Introducing Classes, Objects and Methods Class Fundamentals, How Objects are Created, Reference Variables and Assignment, Methods, Returning from a Method, Returning Value, Using Parameters, Constructors, Parameterized Constructors, The new operator Revisited, Garbage Collection and Finalizers, The this Keyword.	

UNIT – II	08 Hours
A Closer Look at Methods and Classes: Controlling Access to Class Members, Pass Objects to Methods, How Arguments are passed, Returning Objects, Method Overloading, Overloading Constructors, Recursion, Understanding Static, Introducing Nested and Inner Classes, Varargs: Variable-Length Arguments. Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Using super to Call Superclass constructors, Using super to Access Superclass Members, Creating a Multilevel Hierarchy, When are Constructors Executed, Superclass References and Subclass Objects, Method Overriding, Overridden Methods support polymorphism, Why Overridden Methods, Using Abstract Classes, Using final, The Object Class.	

UNIT – III	08 Hours
Interfaces: Interface Fundamentals, Creating an Interface, Implementing an Interface, Using Interface References, Implementing Multiple Interfaces, Constants in Interfaces, Interfaces can be extended, Nested Interfaces, Final Thoughts on Interfaces. Packages : Package Fundamentals, Packages and Member Access, Importing Packages, Static Import. The Exception Hierarchy: Exception Handling Fundamentals, The Consequences of an Uncaught Exception, Exceptions Enable you to handle errors gracefully, using Multiple catch clauses, Catching subclass Exceptions, try blocks can be nested, Throwing an Exception, A Closer look at Throwable, using finally, using throws, Java's Built-in Exceptions, New Exception features added by JDK 7, Creating Exception Subclasses.	

UNIT – IV	08 Hours
Multithreading fundamentals The Thread Class and Runnable Interface, Creating Thread, Creating Multiple Threads, Determining When a Thread Ends, Thread Priorities, synchronization, using Synchronization Methods, The Synchronized Statement, Thread Communication using notify(), wait() and notify All(), suspending, Resuming and stopping Threads.	

UNIT – V	08 Hours
Auto boxing and Annotations Enumerations, Java Enumeration are class types, The Values () and Valueof() Methods, Constructors, methods, instance variables and enumerations, Auto boxing, Annotations(metadata) Networking with Java.net Networking fundamentals The Networking classes and Interfaces, The InetAddress class, The Socket Class, The URL class, The URLConnection Class, The HttpURL Connection Class.	

TEXT BOOKS:

1.	JimKeogh, The complete ReferenceJ2SE, 1 st edition, TataMc_Graw Hill, 2017.
2.	HerbertSchildtTheCompleterefrence, 7 th Edition, TaTaMcGraw Hill, 2023.

REFERENCE BOOKS:

1.	Programming with Java, E.Bala guruswamy, 6 th Edition, McGraw Hill Education 2019.
2.	B.V.Kumar, J2SE Architecture Book, Addison –Wesley, 2007

WEB LINKS:

1.	https://www.roseindia.net/
2.	https://javatpoint.com/
3.	https://tutorialspoint.com/

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	Apply the concept of class and objects with access control to represent real world entities.
CO2	Identify and review the types of methods, class and inheritance concept.
CO3	Investigate the concept of interface, usage of package and review the run time exceptions.
CO4	Analyze the thread concepts, communication and synchronization.
CO5	Review the network fundamentals, enumerations, annotations and auto boxing wrapping class.

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	2	1	1	1			
	CO2	2	2	2	1	1			
	CO3	2	2	2	1	1			
	CO4	2	2	2	1	1			
	CO5	2	2	2	1	1			

1: Low, 2: Medium, 3: High

Computer Networks

Contact Hours/Week	:	3+0 (L+T)	Credits	:	03
Total Lecture Hours	:	40	CIE Marks	:	50
Total Tutorial Hours	:	-	SEE Marks	:	50
Course Code	:	S1MC04	Course	PCC	

Course Objectives:

This Course will enable students to:	
1.	Impart knowledge on of computer networks by going through basic terminologies and concepts
2.	Study the conceptual and implementation aspects of network applications, including application layer protocols, clients, servers, processes and interfaces
3.	Understand the principles as to how two entities can communicate reliably over a medium through series of complicated scenarios.
4.	Understand how forwarding and routing functions of the network layer.
5.	Recall the different types of link layer channels, Random access protocols and basic networking hardware transmission technologies of a network.

UNIT – I	08 Hours
Introduction to Computer Networks, Protocol layers: Computer Networks and the Internet: The network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and their Service Models, Networks under attacks.	

UNIT – II	08 Hours
Application Layer: Application Layer: Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet-SMTP, DNS- The Internet's Directory Service: Services provided by DNS, overview of how DNS works.	

UNIT – III	08 Hours
Transport Layer: Introduction and Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, UDP checksum, Principles of Reliable Data Transfer, Connection-Oriented Transport-TCP, positive and negative acknowledgements, ARQ protocols, Go-Back-N protocol, SR protocol.	

UNIT – IV	08 Hours
The Network Layer: Overview of Network Layer, What's inside a Router? The Internet Protocol (IP), IPv4 datagram format, fields, functions. IPv6 protocol, format, fields, differences between IPv4 and IPv6.	

UNIT – V	08 Hours
The Link Layer: Introduction to the link layer, Error-Detection and Correction Techniques, Multiple Access Links and Protocols: Channel Partition, Random Access protocols, Dynamic host configuration protocol-DHCP. Physical layer: Guided transmission media, magnetic media and twisted pairs, coaxial cables, fiber optic cables, satellite communication. Wireless networks, components of wireless networks, network characteristics.	

TEXT BOOKS:

1.	James F Kurose and Keith W Ross “Computer Networking”: A Top-Down Approach (7th Edition), Pearson Publication, 2017
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REFERENCE BOOKS:

1.	Andrew S. Tanenbaum and David J. Wetherill, "Computer Networks", 5th edition, Prentice Hall, 2014.
2.	Larry L Peterson and Bruce S. Davie, "Computer Networks": A Systems Approach, 6th Edition, Morgan Kaufmann. 2016.

WEB LINKS:

1.	https://gaia.cs.umass.edu/kurose_ross/lectures.php
2.	https://gaia.cs.umass.edu/kurose_ross/interactive/
3.	https://gaia.cs.umass.edu/kurose_ross/knowledgechecks/
4.	https://nptel.ac.in/courses/106105081
5.	https://archive.nptel.ac.in/courses/106/105/106105183/

Course Outcomes:

After the completion of this course, students will be able to:	
CO1.	Identify the different network components and layers.
CO2.	Identify and review the functionalities of the predominant protocols of application layer.
CO3.	Review the functionalities and services of Transport layer.
CO4.	Identify and analysis the functionalities of network layer.
CO5.	Identify and analysis the various functionalities of link layer protocols and transmission technologies of a network.

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	3	2	1		1			
	CO2	2	2	1		1			
	CO3	2	2	1		1			
	CO4	3	2	1		1			
	CO5			3		1			

1: Low, 2: Medium, 3: High

Data Structures

Contact Hours/Week	:	3+2(L+P)	Credits	:	04
Total Lecture Hours	:	40	CIE Marks	:	50
Total Practical Hours	:	26	SEE Marks	:	50
Course Code	:	S1MCI01	Course		IPCC

Course Objectives:

This Course will enable students to:	
1.	Differentiate the properties of various data structures such as stacks, queues, lists, trees and Graphs.
2.	Understand working of various sorting and searching techniques.
3.	Recognize the applications of various Data Structures

UNIT – I	08 Hours
The Stack: Definition and Examples, representing Stacks in C using static memory allocation, Applications of stack: conversion of infix to postfix, evaluation of postfix expression, Recursion: Binary search, product of two numbers and Fibonacci series. Queues: Types of Queues: Linear, Circular, Priority and Double Ended Queues. Linear and circular queue implementation using static memory allocation. Practical Component: 1) Implementing stack using arrays. 2) Program to evaluate postfix expression. 3) Implement Queues using arrays. 4) Implement Circular queue using arrays.	

UNIT – II	08 Hours
Dynamic memory allocation: malloc(), calloc(), realloc(), free(). Singly Linked lists, Primitive operations on singly linked list: insertion, deletion, and search. Singly linked implementation of stacks, linear queue, and priority queues with integer data. Singly Linked list with non-integer and non-homogeneous lists. Practical Component: 1) Implement menu driven Stack using Singly Linked List. 2) Implement menu driven Queue using Singly linked list.	

UNIT – III	08 Hours
Doubly and Circular linked list: Doubly linked lists, Primitive operations on doubly linked list : insertion, deletion, search. Stack and queues implementation using doubly linked list. Circular lists, Primitive operations on singly circular linked list: Insertions, deletion and search. Practical Component: 1) Implement menu driven Stack using Doubly Linked List. 2) Implement menu driven Queue using Doubly linked list.	

UNIT – IV	08 Hours
Nonlinear data structures: Binary trees, Operations on Binary Trees, Applications of Binary Trees, types of Binary Tree: complete binary tree, strictly binary trees, expression trees, Memory Representations of binary trees, Binary Tree Traversals. Memory representations of binary search trees, Creation of BST, find minimum, find maximum node in BST , tree traversals. Introduction to Graph, graph memory representation, graph traversal: DFS and BFS. Practical Component: 1) Implement BST creating and tree traversal	

UNIT – V	08 Hours
Searching and Sorting: Sequential search, binary search, hashing: Hash Table organizations, Hashing Functions, Static and Dynamic Hashing. Insertion sort, selection sort, bubble sort, Radix sort, Address Calculation Sort and Shell Sort	
Practical Component:	
1) Implement Insertion, selection and bubble sort	

TEXT BOOKS:

1.	Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum Data structures using C and C++, PHI/Pearson, 2nd Edition, ,2015
2.	Seymour Lipschutz, Data Structures, Schaum's outline series, McGrawHill, July 2017

REFERENCE BOOKS:

1.	Horowitz, Sahni and Anderson-Freed Fundamentals of Data Structures in C, 2nd Edition, UniversitiesPress Pvt. Ltd., 2011
2.	Jean- Paul Tremblay Paul G. Sorenson An Introduction to Data Structures with Applications, 2nd edition, McGraw-Hill International, 2007
3.	Amol M Jagtap, Ajit S Mali, Data Structures using C:A Practical Approach for Beginners, First edition 2022, CRC Press.

WEB LINKS:

1.	https://www.javatpoint.com/data-structure-in-c
2.	https://www.tutorialspoint.com/data_structures_algorithms/data_structures_and_types.htm
3.	https://www.tutorialspoint.com.cach3.com/data_structures_algorithms/index.htm

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	Analyze and develop linear data structures: stacks & queues using static memory allocation.
CO2	Review and develop formulate different types of linked lists using dynamic memory allocation.
CO3	Apply the knowledge of Stacks, Queues and linked lists to develop solutions for given problems.
CO4	Identify and develop the non-linear data structures: trees & graphs and its applications.
CO5	Review and analyze the working of different sorting and searching techniques.

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	2	2	1	1			
	CO2	2	2	2	1	1			
	CO3	2	2	3	1	1			
	CO4	2	2	2	1	1			
	CO5	2	2	2	1	1			

1: Low, 2: Medium, 3: High

Web Technologies Lab with Mini Project

Contact Hours/Week	:	3	Credits	:	1.5
Total Lecture Hours	:	-	CIE Marks	:	50
Total Tutorial Hours	:	-	SEE Marks	:	50
Course Code	:	S1MCL1	Course	:	PCCL

Course Objectives:

This Course will enable students to:	
1.	Implement the usage of Web environment and demonstrate the functionality of static and dynamic web elements such as HTML5,CSS,Http.
2.	Design the dynamic web pages using JavaScript to implement validation features.
3.	Build efficient and scalable client side and server-side applications using Node.js and Express
4.	Integrate MongoDB with Node.js applications to perform CRUD operations, manage data efficiently

Experiment No	Problem statement of Lab Program
1	Design and Structure a Online Book Store Static Webpage.
2	Design and beautify the Online Book Store Static Webpage using CSS.
3	Create a Responsive Web design using HTML5, CSS and Bootstrap grid system.
4	Design and develop a dynamic web-based Student Management System using HTML, CSS, DOM and JavaScript.
5	Develop HTML5 code that demonstrates JavaScript error handling, asynchronous data operation, and DOM manipulation
6	Design and Develop a Simple Node.js Application to Read and Write Files using Promises
7	Design and Develop a Basic Express.js Web Server Application with Routes
8	Connect Node.js Application to MongoDB and Perform Basic CRUD operations

WEB LINKS:

1.	https://www.w3schools.com
2.	https://getbootstrap.com/2.0.1/less.html#compiling
3	https://www.nodejs.org
4	https://expressjs.com
5	https://www.mongodb.com/docs/

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	Design and develop web applications with the usage of the web elements HTML5, CSS and Bootstrap
CO2	Develop dynamic web pages using JavaScript to implement validation features.
CO3	Set up and implement the usage of package management tool NodeJs/Express on Web applications
CO4	Develop web pages integrating MongoDB with NodeJs applications to perform CRUD operations

Course Articulation Matrix (Correlation between CO's and PO's)

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	2	2	2	1			
	CO2	2	2	2	2	1			
	CO3	2	2	2	2	1			
	CO4	2	2	2	2	1			

Java Lab

Contact Hours/Week	:	3	Credits	:	1.5
Total Lecture Hours	:	-	CIE Marks	:	50
Total Tutorial Hours	:	-	SEE Marks	:	50
Course Code	:	S1MCL2	Course	:	PCCL

Course Objectives:

This Course will enable students to:	
1.	Design and build Java applications with the implementation of basic Java object oriented methods dynamically.
2.	Implement the mutable and immutable elements and console based implementation of Java String and Thread API .
3.	Design and build Java web applications and implement the usage of packages and enumerations.

Sl.no	Programs
1.	Program on object oriented concepts
2.	Program on this keyword
3	Programs on method overloading and overriding
4	Program on Varargs
5.	Programs on inheritance concepts
6.	Programs on packages
7.	Programs on abstract classes and interfaces
8.	Programs on Exception handling
9.	Programs on multithreading
10.	Programs on autoboxing and annotation

WEB LINKS:

1.	https://www.roseindia.net/
2.	https://javatpoint.com/
3.	https://tutorialspoint.com/
4.	https://w3schools.com/

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	Apply the Object-Oriented programming language features.
CO2	Design and develop the concept of inheritance, interfaces and packages.
CO3	Analysis & develop the run time exception handling.
CO4	Identify the concept of multithreading, autoboxing and annotation.

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	2	2	1	1			
	CO2	2	2	2	1	1			
	CO3	2	2	2	1	1			
	CO4	2	2	2	1	1			

1: Low, 2: Medium, 3: High

Aptitude Related & Analytical Skill

Contact Hours/Week	:	36 Hours for the entire semester	Credits	:	0
Total Lecture Hours	:	-	CIE Marks	:	100
Total Tutorial Hours	:	-	SEE Marks	:	-
Course Code	:	S1ARAS	Course	:	AEC

Modules Covered:

Sl. No.	Module covered	Duration (in hrs.)
1	Quantitative Aptitude	16
2	Verbal Reasoning	08
3	Logical Reasoning	08
4	Test taking strategies to crack recruiter tests	02
5	Post-Training Assessment along with debrief	02
	Total Course	36

Methodology: Instructor led – Concepts with guided question-solving, assignments and homework assessments

Sl.no	Programs
1.	Quantitative Aptitude (with focus on questions from top recruiters) (16 Hours) - Number System - Classification of numbers Divisibility tests - Power cycles and remainders - Factors and multiples - Applications of HCF and LCM - Profit and Loss, Partnerships and Averages - Basic terminology in Profit and Loss - Partnerships - Averages and weighted averages - Mixtures and alligations - Time and Work - Working with different efficiencies - Pipes and cisterns - Work equivalence - Division of wages - Time, Speed and Distance - Basics of Time Speed and Distance - Relative Speed - Problems based on trains - Problems based on boats and streams - Problems based on Races - Percentages, Simple and Compound Interest - Percentages as fractions and decimals - Percentage increase / decrease - Simple interest and compound interest - Relationship between simple and compound interest - Permutation, Combination and Probability - Fundamental counting principle - Basics of permutation and combination

	• Computation of permutation • Circular permutation • Computation of combination • Probability g) Logarithms, Progressions, Geometry and Quadratic Equations • Logarithms • Progressions – Arithmetic, Geometric and Harmonic • Geometry • Mensuration • Quadratic equations
2.	Verbal Reasoning (with focus on questions from top recruiters)– (8 Hours) a) Reading Comprehension – • Eyespan • Speed reading techniques • Types of questions • Comprehension strategies b) Sentence Correction – • Subject-Verb Agreement • Parallelism • Modifiers • Pronoun Antecedent Agreement • Verb Time Sequence • Comparison • Determiners • Prepositions c) Vocabulary – • Etymology of words • Prefix and suffix • Memory techniques to remember words • Synonyms and antonyms • Analogy d) Sentence Completion and Para Jumbles – • Sentence completion – single blank and double blank questions • Parajumbles – Moving and anchored jumbles
3	Logical Reasoning (with focus on questions from top recruiters) - (8 Hours) a) Coding and Decoding, Series, Analogy, Odd Man Out and Visual Reasoning • Coding and decoding • Number and alphabet series • Analogy • Odd man out • Visual Reasoning b) Data Arrangements and Blood Relations • Linear, circular and distribution arrangements • Blood Relations c) Data interpretation and Data Sufficiency

	• Tables • Pie Charts • Bar Graphs • Data Sufficiency c) Clocks, Calendars, Direction sense and Cubes • Clocks • Calendars (Conventional and shortcut methods to find day of a date) • Cubes • Direction Sense
4	Test taking strategies – (2 Hours) This module will focus on: • Understanding patterns of tests (Adaptive, non adaptive, navigation – intra sectional, inter sectional) • Best strategies to maximize scores and clear cut-offs • Shortcut strategies on Quantitative Aptitude, Logical Reasoning as well as Verbal Ability to ace sections
5.	Post Training Assessment with debrief – (2 Hours) An assessment that tests a student on all three sections of Aptitude, followed a detailed student-wise analysis based on: • Cut-off • Percentile w.r.t the batch • Percentile w.r.t. the college • Corrective measures to be taken to improve the score In class, there will be a debrief on how the test should have been taken by an ideal test taker to navigate through the difficulties and ace the cut-off.
6.	Tests outside training schedule An ideal aptitude training course is a mix of classroom learning / guided question solving, followed by self-practice. The ‘training duration’ focuses mainly on laying strong foundations on concepts and ability to solve questions on major aptitude topics. Significant amount of practice is also provided to students through online tests in the form of: 1. Pre-Assessment test 2. Full-length practice tests 3. Company specific tests (patterns and question types of major recruiters should be given exposure to)

<i>Description</i>	<i>Schedule</i>	<i>Duration (min)</i>	<i>Conducted for</i>
<i>Test - 1</i>	<i>7th Week</i>	<i>90</i>	<i>50 marks</i>
<i>Test - 2</i>	<i>14th Week</i>	<i>90</i>	<i>50 marks</i>
<i>CIE</i>			<i>100 marks</i>

Minimum marks to pass the course is 50% of total CIE.

No SEE component for ARAS.

Reference material –

1. ‘Aptipedia’, Wiley India
2. ‘Quantitative Aptitude for Competitive Examinations’ by R S Agarwal
3. ‘The Pearson Guide to Verbal Ability’ by Nisht K Sinha

Mathematics for MCA Students

Contact Hours/Week	:	3 (L+T)	Credits	:	00
Total Lecture Hours	:	40	CIE Marks	:	100
Total Practical Hours	:		SEE Marks	:	
Course Code	:	S1NCOP	Course		NCMC

Course Objectives:

This Course will enable students to:

1. The mandatory learning course S1NCOP viz., Mathematics Bridge Course for MCA aims to provide basic concepts of Sets, Relations, Logic, Matrices & Determinants, Sequences & Series and Probability Theory.

UNIT – I	08 Hours
Set Theory: Introduction. Representation of sets, Types of Sets, Finite set, Infinite set, equivalent set, disjoint set, Subset, Power set. Venn diagram. Set operations: Union, Intersection, Complement of a set, Difference, Symmetric Difference. Laws of set theory. Cartesian product of sets, Relations and properties.	

UNIT – II	08 Hours
Logic and Propositions: Logic Statement, Propositions, Connectives, Basic Logic Operations: Conjunction, Disjunction, Negation, Implication and Double Implication. Truth table, Logical Equivalence/Equivalent Statements, Tautologies and Contradictions.	

UNIT – III	08 Hours
Matrices and Determinants: Matrix Introduction, Types of matrices, Scalar multiplication, Addition of matrices, Product of matrices. Transpose of a matrix, Symmetric and Skew Symmetric matrix, Rank of a matrix, Determinant of a matrix. Singular matrix.	

UNIT – IV	08 Hours
Sequence and Series: Introduction, Sequences, Series, Arithmetic Progression, Sum of Finite number of terms in A.P, Arithmetic Means, Geometric Progression, sum to n terms of G.P, Geometric Mean, relation between A.M and G.M.	

UNIT – V	08 Hours
Probability Theory: Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications	

TEXT BOOKS:

1.	Kenneth H Rosen, “Discrete Mathematics and its Applications”, McGraw Hill publications, 7th edition.
2.	Walpole Myers Ye “Probability and Statistics for engineers and Scientist” Pearson Education, 8th edition.

REFERENCE BOOKS:

1.	Richard A Johnson and C. B Gupta “Probability and statistics for engineers” Pearson Education
2.	J.K Sharma “Discrete Mathematics”, Mac Millan Publishers India, 3rd edition, 2011.
3.	Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 43rd Edition, 2015

WEB LINKS:

1.	http://ac.in/courses.php?disciplineID=111
2.	http://www.class-central.com/subject/math(MOOCs)
3.	http://academicearth.org/

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	Widen the knowledge of Basic concepts in Set Theory and Apply the fundamentals of set theory and Relations to the given problem
CO2	Understand mathematical reasoning to read, comprehend and construct mathematical arguments
CO3	Understand the Basic Concepts in Matrices and Formulate the problems in Matrix expression
CO4	Determine the sum of the first n terms of an arithmetic and Geometric series
CO5	Get the basic concepts of probability and find the probability of simple and compound events

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1								
	CO2								
	CO3								
	CO4								
	CO5								

1: Low, 2: Medium, 3: High

Research Methodology and IPR

Contact Hours/Week	:	2	Credits	:	PP/NP
Total Lecture Hours	:	20	CIE Marks	:	100
Total Tutorial Hours	:	-	SEE Marks	:	
Course Code	:	S1NCMC	Course		NCMC

Course Objectives:

This Course will enable students to:	
1.	Identify the area of research and set the objectives and Research process
2.	Carryout literature review and define the research problem.
3.	Develop research plan and sampling design.
4.	Understand the concepts/section of Copy Right Act /Patent Act / Trademark to the given case and develop –conclusions.

UNIT – I	04 Hours
Discussion on what is research: Meaning, Objectives and Motivation. Types of research: Overview with examples, Research Process, Criteria of Good Research and problems Encountered by researchers India.	

UNIT – II	04 Hours
Research Problem, Selecting the Problem, Necessity of Defining the Problem, Techniques involved in Defining a problem, Literature Review: Place of the literature review in research, Bringing clarity and focus to your research problem, Writing about the literature reviewed.	

UNIT – III	04 Hours
Measurement and scaling techniques, Experimental and modelling skills: Experiment design, Data collection methods, Data analysis and interpretation.	

UNIT – IV	04 Hours
Writing and presentation skills, Significance of Report writing, Different steps and Layout of the Research Report, How to prepare effective oral, poster and digital presentation.	

UNIT – V	04 Hours
Intellectual Property Rights (IPR)-Basic Introduction and laws, IPR: Patent, Design, Trademark, Geographical Indication, and Copyrights, Trademark, Service mark, Certification mark and Collective mark World Intellectual Property Organization's (WIPO) role and activity.	

TEXT BOOKS:

1.	Kothari, C.R. and Gaurav Garg, Research Methodology: Methods and Techniques. New Age International, 4th Edition, 2018.
2.	Research Methodology a step-by-step guide for beginners. (For the topic Reviewing the literature under module 2), Ranjit Kumar SAGE Publications, 3rd Edition, 2011

REFERENCE BOOKS:

1.	Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2.	Subbarau NR-Handbook on Intellectual Property Law and Practice-S Viswanathan Printers and Publishing Private Limited.1998
3	Handbook of Research Ethics and Scientific Integrity, Springer, 2020. ISBN: 978-3-030-16758-5
4	Study Material (For the topic Intellectual Property under module 5), Professional Program Intellectual Property Rights, Law and Practice, The Institute of Company Secretaries of India, Statutory Body Under an Act of Parliament, September 2013.

WEB LINKS AND VIDEO LECTURES (e-RESOURCES) :

	https://onlinecourses.nptel.ac.in/noc22_ge08/preview
	https://www.youtube.com/watch?v=XEMyDu_VoeQ
	https://www.youtube.com/watch?v=GSeeyJVD0JU

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	Identify research categories and develop research plans.
CO2	Conduct and investigate research problems and carry out literature review.
CO3	Investigate and Develop Research design and framework for experimentation.
CO4	Plan and develop systematically the research and technical report.
CO5	Analyze and Evaluate Intellectual Property Rights

Course Articulation Matrix (Correlation between CO's and PO's)

COs	POs							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		1			1			1
CO2		1			1		2	1
CO3		1	1		1			1
CO4		1			1			1
CO5							2	

Degree of compliance 1: Low 2: Medium 3: High

II Semester

Database Systems

Contact Hours/Week	:	3+2(L+T)	Credits	:	04
Total Lecture Hours	:	40	CIE Marks	:	50
Total Tutorial Hours	:	26	SEE Marks	:	50
Course Code	:	S2MC01	Course	PCC	

Course Objectives:

This Course will enable students to:	
1.	Understand the different issues involved in the design and implementation of a database system.
2.	Study the physical and logical database designs, database modeling, relational, hierarchical, and network models
3.	Understand and use data manipulation language to query, update, and manage a database
4.	Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
5.	Analyze relational and non-relational data model to check the performance of the data models with respect to design and manipulations

UNIT – I	08 Hours
Introduction; An example; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems.	

UNIT – II	08 Hours
Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two. Relational Model and Relational Algebra: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.	

UNIT – III	08 Hours
Data Definition and Data Types, Specifying Constraints in SQL, Basic Retrieval Queries in SQL, INSERT, DELETE, and UPDATE Statements in SQL, More Complex SQL Retrieval Queries, Views (Virtual Tables) in SQL, Schema Change Statements in SQL ,Discretionary Access Control Based on Granting and Revoking Privileges, Transaction Support in SQL (Commit, Rollback, Save point)	

UNIT – IV	08 Hours
Introduction to PL/SQL programming, PL/SQL blocks, Cursor types, Stored Procedures, Functions, Exception handling, Packages and Triggers. Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Cod Normal Form, Denormalization,	

UNIT – V	08 Hours
NoSQL, SQL versus NoSQL, Types of NoSQL Databases, CAP theorem, Getting Started with MongoDB – Documents, Collections, Databases, Getting and Starting MongoDB, MongoDB Shell, Data Types, Inserting and Saving Documents, Removing Documents, Updating Documents, Introduction to find, Query Criteria, Type Specific Queries and \$where Queries	

TEXT BOOKS:

1.	Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Pearson Publishers, 2016 (Chapters 1, 2, 3 except 3.8, 5, 6.1 to 6.5, 7.1, 8, 10,11)
2.	Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, 3rd Edition, McGraw-Hill, 2003. (Chapters 16, 17.1, 17.2, 18)
3.	Professional NOSQL, Shashank Tiwari, 1 st Edition, 2011, John Wiley & Sons, ISBN: 978-0-470-94224-6
4.	MongoDB: The Definitive, Guide Kristina Chodorow and Michael Dirolf, 1 st Edition, 2010 O'Reilly Media, ISBN: 978-1-449-38156-1.
5.	PL/SQL Programming: Develop Powerful PL/SQL Applications, - Scott Urman 5 th Edition, 2010, TaTa McGraw –Hill Publications, ISBN: 0-07-048680-8.

REFERENCE BOOKS:

1.	Silberschatz, Korth and Sudharshan: Data base System Concepts, 5th Edition, Mc-GrawHill, 2006.
2.	C.J. Date, A. Kannan, S. Swamynatham: A Introduction to Database Systems, 8th Edition, Pearson education, 2006.
3.	Oracle PL/SQL Best Practices by Steven Feuerstein, O'Reilly Publications, 2 nd Edition, ISBN – 10-81-8404-541-7, 2007

WEB LINKS:

1.	https://nptel.ac.in/courses/106/105/106105175/
2.	https://www.youtube.com/watch?v=T7AxM7Vqvaw&t=10s
3.	https://www.youtube.com/watch?v=BPHAr4QGGVE
4.	https://www.youtube.com/watch?v=uD3p_rZPBUQ
5.	https://www.youtube.com/watch?v=t4wPUQ5REIY

Course Outcomes:

After the completion of this course, students will be able to:	
CO1.	Identify the fundamentals of database technologies and its different architectures.
CO2.	Analyse the Entity Relational model concepts and design relational algebraic expressions for SQL queries.
CO3.	Illustrate the various concepts of SQL and formulate Queries to perform CRUD operations on database.
CO4.	Analyze the fundamentals of PL/SQL Programming constructs and its relevance to the applications and apply the database design process with Normalization concepts.
CO5.	Illustrate non-relational data model for the problem and analyze the performance with respect to design and manipulations.

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	2			1			
	CO2	2	2	2		1			
	CO3	3	2	2	1	1			
	CO4	2	2	2	1	1			
	CO5	2	2	2	1	1			

1: Low, 2: Medium, 3: High

Advanced Web Technologies

Contact Hours/Week	:	3+2(L+T)	Credits	:	04
Total Lecture Hours	:	40	CIE Marks	:	50
Total Practical Hours	:	26	SEE Marks	:	50
Course Code	:	S2MCI01	Course		IPCC

Course Objectives:

This Course will enable students to:	
1.	Acquire foundational knowledge of React basics, including project setup, JSX rendering, functional components, hooks, and component interactions for building dynamic web applications.
2.	Master React templates, data binding, and global state management using JSX, controlled components, and the React Context API.
3.	Implement full CRUD operations, integrate React with APIs using Axios, handle side effects with useEffect, and manage routing with React Router for navigation.
4.	Explore generative AI for website creation using ChatGPT, covering web page deployment, design customization, content management, form generation.
5.	Acquire foundational knowledge of Web 3.0 and Blockchain, including its layers, architecture, DApps, decentralization, and real-world applications

UNIT– I	08Hours
Introduction to React: Understanding React, setting up a React project using Create React App (CRA) or Vite, building the first React app, using JSX for rendering, and exploring the React Developer Tools. React Components: Functional components, state, props, and component lifecycle. Introduction to hooks like useState and useEffect. Component Interaction: Parent-child communication, handling events, and reusable components. Practical Component: - Create a Hello World project in React to understand the basic project structure. - Todo List Manager App – Add, mark as complete, and list tasks.	

UNIT– II	08Hours
React Templates: Using JSX for text interpolation and template expressions. Conditional rendering and loops with map(). Data Binding: Handling forms with controlled components, two-way binding using state, and handling events. React Context API: Managing global state and dependency injection. Practical Component: - Create a Personal Portfolio Website using React. - Build a React app to demonstrate data binding with dynamic forms.	

UNIT– III	08Hours
CRUD Operations in React: Creating a full CRUD module using a React frontend and RESTful API backend (Node.js and Express). React with APIs: Fetching data with Axios or fetch(), managing side effects with useEffect, and error handling. Routing: Implementing React Router for navigation. Practical Component: - Develop a Book Management App with full CRUD operations and RESTful API integration. - Build a React app for converting units like length, weight, temperature, etc., with options to add or remove custom units. Additional Projects:	

3. Develop an app to split expenses among a group of people, showing each person's share, with options to edit or delete entries.
4. Create an app that fetches live exchange rates from an API and allows users to convert amounts between different currencies.
5. Develop a tool where users can test their typing speed with randomly generated text and view their typing statistics.
6. Build a tool for developers to save, organize, and search their frequently used code snippets, categorized by language or tags.
7. A live Markdown editor with preview functionality for writing README files or documentation.

UNIT– IV	08Hours
Generative AI based website building Introducing website creation with ChatGPT, Creating and deploying your first web page, Working with fonts, colors, and headings, Publishing page posts, Adding links and navigation, Generating site forms, Setting up a photo gallery Practical Component: 1. Web site creation using AI	

UNIT– V	08Hours
Overview of Web 3.0 And Blockchain What is Web 3.0?, Layers of Web 3.0, What Are The Properties of Web 3.0?, Web 3.0 Architecture, DApps — The Gateway to Web 3.0, Real-World Examples of Web 3.0, Moving Towards Decentralization, The Significance of Blockchain in Web 3.0, How Did Blockchain Pave the Way for Web 3.0?, Examples of Blockchain in Web 3.0 Practical component: 1. Implementation of any real-world example of block chain in Web3.0	

TEXT BOOKS:

1	Learning React: Functional Web Development with React and Redux by Alex Banks and Eve Porcello, 2nd Edition, O'Reilly Media, ISBN: 978-1492051718.
2.	Fullstack React: The Complete Guide to ReactJS and Friends by Accomazzo, Murray, and Seltzer, 2nd Edition, Fullstack.io, ISBN: 978-0991344620.
3	Pro React by Adam Freeman, 1st Edition, Apress, ISBN: 978-1484202694.
4	Build a Website with ChatGPT, Paul McFedries, 2024, Manning, ISBN: 9781633436961, 1633436969
5	WEB 3: What Is Web3? Potential of Web 3.0, Patrick Ejeke, 2022, IGI Global, ISBN:9781668459652, 1668459655

REFERENCE BOOKS:

1.	<i>React Up & Running: Building Web Applications</i> by Stoyan Stefanov, 1st Edition, O'Reilly Media, ISBN: 978-1491931820.
2.	<i>React Cookbook</i> by David Griffiths and Dawn Griffiths, 1st Edition, O'Reilly Media, ISBN: 978-1492051718.
3.	<i>Blockchain Basics: A Non-Technical Introduction in 25 Steps</i> by Daniel Drescher, 1st Edition, Apress, ISBN: 978-1484226035.

WEBLINKS:

1.	https://www.w3schools.com/REACT/DEFAULT.ASP
2.	https://www.youtube.com/watch?v=QFaFIcGhPoM
3.	https://www.geeksforgeeks.org/how-to-use-reactjs-with-html-template/
4.	https://www.tutorialspoint.com/gen-ai/index.htm
5	https://www.simplilearn.com/tutorials/blockchain-tutorial/what-is-web-3-0

Course Outcomes:

After the completion of this course, students will be able to:	
CO1.	Articulate and implement core constructs of React, including project setup, JSX rendering, functional components and component interactions for dynamic application development
CO2.	Master React templates, data binding, and state management with JSX, controlled components, and the Context API.
CO3.	Implement CRUD operations, integrate APIs with Axios, manage side effects with useEffect, and handle routing with React Router.
CO4.	Describe the principles and processes involved in building websites using Generative AI , including the utilization of tools for layout design, content creation, and deployment strategies.
CO5.	Review and articulate the principles and architecture of Web 3.0 and blockchain technology ,

COURSE ARTICULATION MATRIX (Correlation between CO's and PO's)

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	2	2	2	1			1
	CO2	2	2	2	2	1			1
	CO3	2	2	2	2	1			1
	CO4	2	2	2	2	1			1
	CO5	2	2	2	2	1			1

Degree compliance: 1: Low, 2: Medium, 3: High

Software Engineering and Project Management

Contact Hours/Week	:	3+0(L+T)	Credits	:	03
Total Lecture Hours	:	40	CIE Marks	:	50
Total Tutorial Hours	:		SEE Marks	:	50
Course Code	:	S2MC02	Course		PCC

Course Objectives:

This Course will enable students to:	
1.	Define software engineering and explain its importance.
2.	Discuss the concepts of software products and software processes.
3.	Introduce the notion of professional responsibility.
4.	Deliver successful software projects that support organization's strategic goals.
5.	Plan and manage projects at each stage of the software development life cycle(SDLC).
6.	Create project plans that address real-world management challenges.

UNIT – I	08 Hours
Introduction to Professional Software Development and Ethics: Professionalism in Software Engineering, Software Engineering Ethics, and IEEE/ACM Code of Ethics Software Processes and Methodologies: Overview of Software Processes, Waterfall, Incremental, and Plan-Driven Models, The Rational Unified Process (RUP), Extreme Programming (XP) and Scrum, Introduction to DevOps and DevOps vs. Agile, Case Study: Selecting Development Method for Real-world Problems.	

UNIT – II	08 Hours
Requirements Engineering: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; Interface specification; the software requirements document, Requirements Specification, Characteristics and components of SRS, Structure of SRS (IEEE format) Requirements Engineering Processes: Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management.	

UNIT – III	08 Hours
System Modeling and Architectural Design: Context models; Structural models; Behavioral models; Model driven engineering, Architectural Design: Architectural design decisions, Architectural patterns; Interaction Modeling: Use case models, Sequence diagrams; Structural modeling : Classdiagrams; Agile Software Development and Project Management Overview: Agile Methods and Principles; Plan- Driven and Agile Development; Agile Project Management; Scaling Agile Methods.	

UNIT – IV	08 Hours
Introduction to Project Management Understanding the Importance of Software Project Management Importance of software project management: What is a project? Problems with Software Projects What is Project Management? Stages of Project. The Feasibility Study Planning. Project Execution. The Stakeholder of Project. All parties of project. The Role of Project Manager. Project Management Framework Project Planning	

Integration Management. What is Integration Management. Project Plan Development. Plan Execution. Scope Management. What is Scope Management? Methods for Selecting Projects. Project Charter. Scope Statement. Work Breakdown Structure. Stepwise Project Planning Overview. Main Steps in Project Planning.

UNIT – V	08 Hours
Project Scheduling Time Management. Importance of Project Schedules. Schedules and Activities. Sequencing and Scheduling Activity. Project Network Diagrams. Network Planning Models. Duration Estimating and Schedule Development. Critical Path Analysis. Program Evaluation and Review Technique (PERT). Project Quality Management Quality of Information Technology Projects. Stages of Software Quality Management Quality Planning. Quality Assurance. Quality Control. Quality Standards. Tools and Techniques For Quality Control. Project Communication Management Communications Planning. Information Distribution. Performance Reporting. Administrative Closure. Suggestions for Improving Project Communications.	

TEXT BOOKS:

1.	Ian Sommerville, Software Engineering, 9 th Edition, Pearson Education Ltd., 2017.
2.	Kathy Schwalbe, Information Technology Project Management, International Student Edition, THOMSON Course Technology, 8 th Edition 2018.

REFERENCE BOOKS:

1.	Roger S. Pressman: Software Engineering - A Practitioners approach, 7 th edition, McGraw-Hill, 2009.
2.	Waman S. Jawadekar: Software Engineering Principles and Practice, 1 st edition, McGraw-Hill 2004.
3.	Bob Hughes and Mike Cotterell, "Software Project Management", Fifth Edition, Tata McGraw-Hill, 2009.

WEB LINKS:

1.	https://www.computer.org/education/bodies-of-knowledge/software-engineering
2.	https://www.scrummanager.com/files/nato1968e.pdf The NATO Software Engineering Conferences (interesting historic material)
3.	https://www.slideshare.net/slideshow/software-engineering-code-of-ethics-and-professional-practice-83188572/83188572 Software Engineering Code of Ethics and Professional Practice established in a joint effort by IEEE-CS and ACM
4.	https://nptel.ac.in/courses/106/105/106105087/

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	Analyze and apply professional and ethical principles in software development based on IEEE/ACM codes and industry standards, while selecting and utilizing appropriate methodologies such as Waterfall, RUP, XP, Scrum, and DevOps for real-world problem scenarios.
CO2	Develop a comprehensive Software Requirements Specification (SRS) using IEEE standards by identifying various types of requirements and applying the complete requirements engineering process.
CO3	Design and interpret system models and architectural patterns and apply Agile methodologies and project management principles in software development.
CO4	Demonstrate an understanding of software project management by describing project life cycle stages and applying scope and integration management in planning.
CO5	Apply project scheduling and quality management techniques, including network diagrams, critical path analysis, and communication planning.

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	2			1			
	CO2	2	2			1			
	CO3	2	2		2	1	2		
	CO4	2	2			1			
	CO5	2	2	2		1			

1: Low, 2: Medium, 3: High

Specialization A

Block Chain Technologies

Contact Hours/Week	:	03(L)	Credits	:	03
Total Lecture Hours	:	40	CIE Marks	:	50
Total Tutorial Hours	:		SEE Marks	:	50
Course Code	:	S2MCA1	Course		PEC

Course Objectives:

This Course will enable students to:	
1.	Comprehend the fundamentals of the Blockchain and its organization
2.	Describe the underlying concepts of working of a Blockchain.
3.	Infer the working principle of Bitcoin .
4.	Interpret the working of using Ethereum.
5.	Examine possible business applications of Blockchain.

UNIT – I	08 Hours
Introduction to blockchain , back history of blockchain , what is blockchain?, centralized vs. Decentralized systems, layers of block chain, application layer, execution layer, semantic layer, propagation layer, consensus layer, why is blockchain important?, limitations of centralized systems, adoption so far, blockchain uses and use cases.	

UNIT – II	08 Hours
Laying the blockchain foundation, game theory, nash equilibrium, prisoner's dilemma, byzantine generals problem, zero-sum games, why to study game theory, computer science engineering. The blockchain , merkle trees, properties of solution, transaction, distributed consensus mechanisms, applications, scaling blockchain, off-chain computation, sharding state.	

UNIT – III	08 Hours
The history of money, what is bitcoin? Working with bitcoins, the bitcoin blockchain, block structure, the genesis block, the bitcoin network, network discovery for a new node, bitcoin transaction, consensus and block mining, block propagation, putting it all together, bitcoin scripts, bitcoin transaction revisited, scripts, full nodes , vs spys, full nodes, spys	

UNIT – IV	08 Hours
From bitcoin to ethereum, ethereum as next-gen blockchain, design philosophy of ethereum, ethereum blockchain, ethereum accounts, tie usage, merkle patricia tree, rlp encoding, ethereum transaction and message structure, ethereum state transaction function, gas and transaction cost, ethereum smart contract, contract creation, ethereum virtual machine and code execution, ethereum ecosystem, swarm whisper, dapp, development components	

UNIT – V	08 Hours
Propelling business with blockchain , recognizing types of market friction, information frictions, interaction frictions, innovation frictions, moving closer to friction-free business networks, reducing information friction, easing interaction friction, easing innovation friction, transforming ecosystems, through increased visibility. Blockchains in action: use cases of financial services, trade finance, post-trade clearing and settlement, cross-border transactions, trusted digital identity, multinational policy management, government, supply chain management, food safety, global trade, healthcare, electronic medical records, and healthcare payment preauthorization.	

TEXT BOOKS:

1.	Bikramaditya Singhal, Gautam Dhameja, Priyansu Sekhar Panda, Beginning Blockchain , Apress Media, 2018, ISBNL 9781484234433 (Chatper 1-4)
2.	Manav Gupta, Blockchain for Dummies, John Wiley & sons, 2 nd IBM Limited Edition, ISBN: 9781119545934 (chapter 3 and 4), 2018

REFERENCE BOOKS:

1.	Peter Lypovonyav, Blockchain for Business 2019, Packt Publishing Limited, 2019, ISBN: 9781789956023
2.	Debajani Mohanty, Ethereum for Architects and Developers, Apress Media, 2018, ISBN 9781484240748

WEB LINKS:

1.	https://archive.nptel.ac.in/courses/106/105/106105235/
2.	https://archive.nptel.ac.in/courses/106/105/106105184/
3.	https://www.tutorialspoint.com/blockchain/index.htm
4.	https://www.guru99.com/blockchain-tutorial.html
5.	https://blockchain.cse.iitk.ac.in/slides-NPTEL-BlockchainTechnologyApplications.pdf

Course Outcomes:

After the completion of this course, students will be able to:	
CO1.	Identify and review the fundamentals of Blockchain and its structure.
CO2.	Review the prerequisite concepts of Blockchain.
CO3.	Analyze the working of Bitcoin cryptocurrency.
CO4.	Apply the knowledge of Ethereum in implementing Blockchain.
CO5.	Identify the potential business use cases of Blockchain.

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	2			1			
	CO2	2	2			1			
	CO3	2	2			1			
	CO4	2	2			1			
	CO5	2	2			1			

1: Low, 2: Medium, 3: High

Cyber Security

Contact Hours/Week	:	3(L)	Credits	:	03
Total Lecture Hours	:	40	CIE Marks	:	50
Total Practical Hours	:		SEE Marks	:	50
Course Code	:	S2MCA2	Course		PEC

Course Objectives:

This Course will enable students to:					
1.	Familiarize cybercrime terminologies and perspectives				
2.	Understand Cyber Offenses and Botnets				
3.	Gain knowledge on tools and methods used in cybercrimes				
4.	Understand phishing and computer forensics				

UNIT – I			08 Hours
INTRODUCTION TO CYBERCRIME			
CYBERCRIME			
Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws, Global Perspectives.			

UNIT – II			08 Hours
CYBER OFFENSES			
HOW CRIMINALS PLAN THEM			
Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cybercaafe & cybercrimes.			
BOTNETS			
The fuel for cybercrime, Attack Vector.			

UNIT – III			08 Hours
TOOLS AND METHODS USED IN CYBERCRIME			
Introduction, Proxy Servers, Anonymizers, Phishing, Password Cracking, Key Loggers and Spyways, Virus and Worms, Trozen Horses and Backdoors, Steganography, DoS and DDOS Attacks, Attacks on Wireless networks.			

UNIT – IV			08 Hours
Phishing and Identity Theft:			
Introduction, methods of phishing, phishing, phishing techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft			

UNIT – V			08 Hours
UNDERSTANDING COMPUTER FORENSICS			
Introduction, Historical Background of Cyber forensics, Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics			

TEXT BOOKS:

1.	Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)
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REFERENCE BOOKS:

1.	Cyber security: Managing Systems, Conducting Testing, and Investigating Intrusions ,Thomas J. Mowbray, John Wiley & Sons, 2013
2.	Cyber Security Essentials James Graham, Ryan Olson, Rick Howard CRC Press 2010

WEB LINKS:

1.	https://www.youtube.com/watch?v=yC_hFm0BX28&list=PLxApjaSnQGi6Jm7LLSxvmNQjS_rt9swsu
2.	https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJCktzIO4DtI4_
3.	https://www.youtube.com/watch?v=6wi5DI6du-4&list=PL_uaekrhGzJIB8X QBxU3zhDwT95xlk

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	Identify and review the cybercrime terminologies.
CO2	Review Cyber offenses and Botnets
CO3	Investigate the tools and methods used on Cybercrime.
CO4	Identify and review the types of Phishing and Identity Theft.
CO5	Review the importance of Computer Forensics.

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	2			1		1	
	CO2	2	2			1		1	
	CO3	2	2			1		1	
	CO4	2	2			1		1	
	CO5	2	2			1		1	

1: Low, 2: Medium, 3: High

Internet of Things with Cloud

Contact Hours/Week	:	3	Credits	:	03
Total Lecture Hours	:	40	CIE Marks	:	50
Total Tutorial Hours	:		SEE Marks	:	50
Course Code	:	S2MCA3	Course		PEC

Course Objectives:

This Course will enable students to:					
1.	Understand the fundamentals of Internet of Things and its building blocks along with their characteristics				
2.	Understand the recent application domains of IoT in everyday life.				
3.	Gain insights about the current trends of associated IoT technologies and IoT analytics.				

UNIT – I			08 Hours
BASICS OF NETWORKING Introduction, Network Types, Layered network models EMERGENCE OF IoT Introduction, Evolution of IoT, Enabling IoT & the Complex Interdependence of Technologies, IoT Networking Components.			

UNIT – II			08 Hours
IoT SENSING AND ACTUATION Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.			

UNIT – III			08 Hours
IoT PROCESSING TOPOLOGIES AND TYPES Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading			

UNIT – IV			08 Hours
ASSOCIATED IOT TECHNOLOGIES Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service. IoT Case Studies Agricultural IoT – Introduction and Case Studies			

UNIT – V			08 Hours
IoT CASE STUDIES AND FUTURE TRENDS Vehicular IoT – Introduction to future trends, Demonstration Healthcare IoT IoT Analytics Case studies			

TEXT BOOKS:

1.	Sudip Misra, Anandarup Mukherjee, Arijit Roy, Introduction to IoT, Cambridge University Press, 1 st edition, 2021.
2.	S. Misra, C. Roy, and A. Mukherjee, Introduction to Industrial Internet of Things and Industry 4.0. CRC Press, 1 st edition, 2020

REFERENCE BOOKS:

1.	Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1 st Edition, VPT, 2014. (ISBN: 978-8173719547)
2.	Francis daCosta, Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, Apress Publications, First Edition, 2013.

WEB LINKS:

1.	Introduction To Internet Of Things By Prof. Sudip Misra IIT Kharagpur https://onlinecourses.nptel.ac.in/noc22_cs53/preview
2.	https://www.edx.org/learn/iot-internet-of-things

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	Identify the basics of IoT networking components and addressing strategies in IoT .
CO2	Classify various sensing devices and actuator types to solve the real world problems.
CO3	Demonstrate the fundamentals of Processing Topologies and its primary focus on IoT Device Design and Selection Considerations.
CO4	Elucidate Associated IoT Technologies through case studies to illustrate the architecture of applications and IoT analytics.

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	1			1			1
	CO2	2	1			1			1
	CO3	2	1			1			1
	CO4	2	1			1			1

1: Low, 2: Medium, 3: High

Database Lab

Contact Hours/Week	:	3	Credits	:	1.5
Total Lecture Hours	:		CIE Marks	:	50
Total Tutorial Hours	:	-	SEE Marks	:	50
Course Code	:	S2MCL1	Course		PCCL

Course Objectives:

This Course will enable students to:	
1.	Design and implement SQL queries in DBMS
2.	Implement the features of PL/SQL programming objects.
3.	Design and implement NoSQL queries in DBMS
4.	Compare the performance of SQL and NoSQL queries

Sl.no	Programs
Part A: SQL Programming	
1.	Practical – 1 : Consider the following tables with their attributes Staff (StaffId, StaffName, JoinDate, Qualification, Designation, Salary, BranchId) Branch (BranchId, BranchName, Intake) Create the above tables by properly specifying the primary keys and the foreign keys. Enter atleast ten tuples (i.e. records) for each relation (i.e. table). Write the SQL Queries for the following requirements 1) List the staff details who hold the Ph. D degree and are working in a particular branch. 2) List the staff details who are drawing the salary in the range of 50000 to 80000. 3) List the staff name whose name starts with 'R' as first character and 'A' as the 3rd character. 4) List the staff details who have joined the institution in the month of January. 5) List the staff details who are working in a particular branch where number of intake is exceeding 60 students. 6) List the branch names along with number of staff members working in each branch, sum of their salaries and average of their salaries. 7) List the staff members who have finished their service by more than 100 months. 8) List the Branch name in which number of staff members working is exceeding by 2. 9) Update the salary of the staff members by increasing 25% who are working in a particular branch where intake is 60 students. 10) Delete the staff member who is drawing a highest salary in a particular branch.
2.	Practical – 2 : Consider the following database of student enrollment in courses and books adopted for each course. STUDENT (<u>USN</u>, StudentName, Dob, Gender, Class) COURSE (<u>CourseNo</u>, CourseName, Department) TEXT (<u>BookId</u>, BookTitle, Publisher, Author)

	ENROLL (USN, CourseNo, Semester, Marks) BOOK_ADOPTION (CourseNo, BookId, Semester) Create the above tables by properly specifying the primary keys and the foreign keys Enter at least 10 records to each table. Execute SQL queries for the following requirements: 1) List the student details and their course details for a particular semester. 2) List the student details under a particular department whose name is ordered in an ascending order. 3) List all the book details under a particular course. 4) List the courses in which number of students enrolled will be more than 2. 5) List the publisher who has published more than 2 books. 6) List the author details who has authored more than 2 books. 7) List the author details who have written book for I semester, computer science course. 8) List only the girls student details whose total number of months starting from their date of birth is more than 200. 9) Update the marks by giving grace marks of 15 % to the boys student who has scored lowest in his class of a particular course. 10) List the course to which maximum number of students have joined.
3	Practical – 3 : Consider the following Employee database. Department (<u>Deptno</u>, Deptname, Location) Employee (<u>EmpNo</u>, EmpName, Job, Manager, HireDate, Salary, Commission, Deptno) SalaryGrade (<u>Grade</u>, LowSalary, HighSalary) Create the above tables by properly specifying the primary keys and the foreign keys Enter at least ten tuples for each relation. Execute SQL queries for the following requirements: 1) List employee names who have joined between the months July to December of the year 1981. 2) List employee details including department and their grade based on the salary of all the employees except clerks. 3) List the employees whose name should not start with a letter 'A' and should not end with a letter 'A' but it should be there in the name. 4) Find all the employees who have joined the company before their managers 5) List the name of employees who have finished their 25 years of experience in the company. 6) List the employee name, salary, PF, HRA, DA and gross; order the results in the ascending order of gross. (PF is 10%, HRA is 50%, DA is 30% of the salary and gross is sum of salary, PF, HRA & DA) 7) List the departments for which no employee is working. 8) List the department name, number of employees working, total salary, average salary, maximum salary and minimum salary in each of the department. 9) List year in which most of the employees have joined the organization (Display the year and no of employees). 10) List the department in which maximum number of employees working.

	Part B: PL/SQL Programming
4	Practical – 4. Consider the following table : Login (LoginId, LoginName, Password, FirstName, LastName) Write a stored procedure to validate Login name and password with following cases Case-1: Procedure has to check the existence of login name. Case-2: Procedure has to validate password with existing login name Note: Procedure has to rise the proper exceptions in both the cases.
5.	Practical – 5 : Consider the following table : Product (ProductId, ProductName, ProductType, PricePerUnit) Write a PL/SQL Package to auto generated product id and insert the values in to the above table by considering following cases. Case-1: Package has to check the existence of records. Case-2: Package has to generate the next number if there are records already exists. Note: Package has to rise the proper exceptions in both the cases.
6	Practical – 6 Consider the following table : Product (ProductId, ProductName, ProductType, PricePerUnit) Write appropriate triggers by considering following events based on the above table. Case-1: A trigger before insert / after insert Case-2: A trigger before update / after update Case-3: A trigger before delete / after delete
	Part C: NoSQL Programming
7	Practical – 7 Create the below Collections, insert suitable tuples and perform the following operations using MongoDB Employee (SSN, Name, Job, Salary) Project (ProjectNo, ProjectName, Duration) Assigned_To (SSN, ProjectNo, NoofHours) a) List the employees who are working with a particular designation b) List the employees who are working in a particular project and drawing the salary greater than 35000 c) List the employees whose name starts with 'S' as first character. d) List the employees who are working as Analyst and drawing the salary in the range of 25000 and 40000. e) List the employees who are working for a particular project whose duration exceeds 100 days.

8	Create the below Collections, insert suitable tuples and perform the following operations using MongoDB Part (PartNo, PartName, Price, Colour), Supplier (SupplierNo, SupplierName, Address) Part_Supplier(PartNo, SupplierNo, SupplyDate, Quantity) a) List the supplier name who are supplying particular parts b) List the SteelGrey colored Part names whose price greater than ₹ 1000 c) List the part names which are supplied by suppliers from a particular address. d) List the part names whose supplied quantity is exceeded by 25 on a particular date. e) List the part names whose price is greater than 500 and supplied quantity is more than 50.
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Part-D : Mini Project (Open ended Problem Statements)

Following is the list of open ended problem statements to which students can develop a database application by using any database tool (Oracle/MySQL/NoSQL). They are free to use any known database tool to develop a small, workable application. Even if they are willing to work other than following application, it will be accepted.

- i. Login Page Validation System.
- ii. Material Requirement Processing.
- iii. Reservation System for any Transport service (Bus / Train / Flight)
- iv. Personal Information System.
- v. Student Admission Processing System.
- vi. Attendance Monitoring System.
- vii. Rooms Booking System.
- viii. Web Based User Identification System.
- ix. Examination Schedule System.
- x. Timetable Management System.
- xi. Hotel Management System.
- xii. Inventory Control System for any small store.
- xiii. Health Care Monitoring System. (Schedule of appointment between Doctor & Patient)
- xiv. Online Retail Store system.
- xv. University Course Enrollment system.
- xvi. Employee Performance system.
- xvii. Social Media Platform.
- xviii. E-Learning Platform.
- xix. Smart Parking System.
- xx. Travel Agency Database.
- xxi. Sports League Management System.
- xxii. Creation of new account / money transfer system. (Banking system)

Please note the following conditions.

1. Mini project should work for which it is developed.
2. Maximum of 3 students per team is allowed.
3. No team is allowed to do the same project.

4. The front end applications are to be developed with any front end tool.
5. A mini project must have:
 - a. Proper schema along with group of tables (with appropriate constraints).
 - b. Proper queries which performs CRUD operations on the database.
 - c. Proper validations should be implemented to work with different data types.
 - d. Must be able to generate reports.

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	<i>Construct</i> a database by using data definition, data manipulation and control languages.
CO2	<i>Analyze</i> and <i>formulate</i> SQL queries for the given relational database schema.
CO3	<i>Implement</i> PL/SQL programming objects for the given relational database schema.
CO4	<i>Analyze</i> and <i>apply</i> NoSQL techniques of non-relational database to solve real time applications.

Course Articulation Matrix (Mapping between COs and POs):

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
<i>Course Outcomes</i>	CO1	2	2	2	1	1			
	CO2	2	2	2	1	1			
	CO3	2	2	2	1	1			
	CO4	2	2	2	1	1			

1: Low, 2: Medium, 3: High

Python and Data Analytics Lab

Contact Hours/Week	:	02(Tutorial) + 03(Practical)	Credits	:	2.5
Total Practical Hours	:		CIE Marks	:	50
Total Tutorial Hours	:		SEE Marks	:	50
Course Code	:	S2MCL2	Course		PCCL

Course Objectives:

This Course will enable the students to:					
1.	Implement Python programs using Python language constructs.				
2.	Understand various data structures provided by Python language.				
3.	Use different libraries for scientific and data intensive applications.				
4.	Build real-world applications using OOP, files and exception handling provided by Python.				
5.	Apply Bar graph, Histogram, Pie chart, scatter plot and Line Graph for Data Visualization.				

Sl. No	Programs
Part – A	
1.	Programs on functions, strings.
2.	Programs on Selection Statements.
3	Programs on Loops and user defined functions.
4	Programs on OOP concepts such as Abstraction, Encapsulation, Inheritance & Polymorphism
5.	Programs on Data structures, files, Exception handling.
Part – B	
1.	Programs on data manipulation using NumPy and pandas.
2.	Programs on data preprocessing.
3.	Programs on data wrangling.
4.	Programs on data visualization.
5.	Programs on data web scraping.
Students must execute one program from Part-A and another from Part-B. Students are allowed to select the programs based on lots.	

WEBLINKS:

1.	https://www.guru99.com/python-tutorials.html
2.	https://www.javatpoint.com/python-programs
3.	https://www.geeksforgeeks.org/python-programming-examples/#file
4.	https://www.sanfoundry.com/python-problems-solutions/
5.	https://www.includehelp.com/python/programs.aspx
6.	https://www.geeksforgeeks.org/data-science-tutorial/

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	Develop Python programs using various programming constructs.
CO2	Develop Python programs using files, exception handling and OOP concepts.
CO3	Analyze and develop Python programs for data manipulation, preprocessing & data wrangling.
CO4	Analyze and develop Python programs for data visualization and Web scraping.

COURSE ARTICULATION MATRIX (Correlation between CO's and PO's)

		Program Outcomes							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
Course Outcomes	CO1	2	2	2	1	1			
	CO2	2	2	2	1	1			
	CO3	2	2	2	1	1			
	CO4	2	2	2	1	1			

1: Low, 2: Medium, 3: High

Soft Skills

Contact Hours/Week	:	3	Credits	:	0
Total Lecture Hours	:	3	CIE Marks	:	100
Total Tutorial Hours	:	-	SEE Marks	:	-
Course Code	:	S2MCSS	Course		NCMC

Course Objectives:

This Course will enable students :	
1.	To make the students aware of the importance of soft skills in the present-day business world and work environment
2.	To learn the science behind picking up any skill quickly
3.	To help students realize as well as develop key soft skills interviewers look for – such as changemanagement, professionalism, inter- and intra-personal skills, adaptability etc.
4.	To develop effective resumes (paper-based as well as video)
5	To understand the importance of and create an effective digital footprint
6	To provide simulated Group Discussion and Personal Interview experience based on the models adopted by reputed companies.
7	To understand professional etiquette to be displayed in workplaces.

METHODOLOGY

Interactive instructor led session with audio-visual aids / case studies.

Day	#	Topic	Sub-topics covered	Duration (Hrs)
1.	1	How to pick up skills faster?	1. Knowledge vs skill 2. Skill introspection 3. Skill acquisition 4. "The 10,000 hours rule" and the converse	2
	2	Interpersonal and Intrapersonal skill building	Social Interaction 1. Interpersonal Communication 2. Peer Communication 3. Bonding 4. Types of social interaction Emotional Management Responsibility 1. Types of responsibilities 2. Moral and personal responsibilities	2
	3.	Professional etiquette	Workplace etiquette - meeting room, pantry, cubicle Dining etiquette Telephone etiquette Email and business correspondence etiquette	2
2.	4	Change Management	Who moved my cheese? Tolerance of change and uncertainty Joining the Bandwagon Adapting change for growth – overcoming inhibition Adapt to changes (tolerance of change and uncertainty) Adaptability Curve Survivor syndrome	2
	5	Creating a digital footprint	1. How what you post online / information online can affect people's and recruiter's perception about you 2. Usage of LinkedIn to further one's career prospects	2

			3. Managing content that one posts on platforms like Twitter, Facebook, Instagram etc. to create positive footprint about oneself Why is it important to leave a digital footprint?	
	6	Time Management	Prioritization - Time Busters Procrastination Scheduling Multitasking Monitoring Working under pressure and adhering to deadlines	2
3	7	Group Discussion – Basics	1.Importance of GDroundSkills assessed in a GD How to ace a GD Dos and donts in a GD Idea generation techniques One mock GD involving participation from 12 volunteers, facilitated by the trainer	2
	8	Personal Interview - Basics	Self-introduction practice. Body language – especially grooming for personal interview.Personal interview – FAQs discussion.	2
	9	Building a resume from scratch	1. How to write a good and impressive Resume. 2. Important aspects of an impressive resume.3.Sample template and formatting ideas.	2
4	10	Group Discussion – Advanced	GD sample Video with analysis and discussion.GD Dos and Don'ts – Worksheet practice. Roleplays for Dos and Don'ts. Idea generation – worksheet practice.	3
	11	Personal Interview - Advanced	1.Extensive discussion on PI FAQs. 2.Interview questions from based on resume - discussion. 3. PI Videos – discussion and analysis. 4. Highlighting successful answers for PI:3 questions.5.Body language during a personal interview. 6.Unconventional types of interviews (Stress, panel, MR, guesstimation)	3
5	12	Resume Writing - Workshop (Drafting a paper-based as well as a video resume)	1. Resume writing – Worksheet practice. 2. 3 stage Resume drafting. 3. Rough draft-1. 4. Rough draft -2. 5. Fair draft. 6. Discussion on specific aspects of an impressive Resume. 8. Creating a video resume	3
	13	Setting and achieving Targets	Ambition, goal, passion and career objective - difference SMART goals and Action plans Obstacles -Failure management (case studies)	1.5
	14	Introspection	Identify your USP - Unique Selling Proposition Recognize your strengths and weakness (SWOT) Nurture strengths Fixing weakness Overcoming your complex Confidence building	1.5
6	15	Group Discussion - Mock	1.Mock Group Discussions featuring groups of 10 people, with each GD lasting for 15 minutes. 2. Detailed feedback for each participant 3.Introspection by the audience to add value to the GD	3

	16	Personal Interview - Mock	1. Mock personal interview for a sample set of candidates 2. Simulate the real personal interview experience. 3. Individual feedback and areas of improvements are shared.	3
ASSESSMENTS PROVIDED The following assessments are integrated into the training programme to best judge a student's proficiency on soft skills. 1. Team building tasks (Inside training hours) 2. Participation in group activities (Inside training hours) 3. Psychometric test 4. Creating a resume				

1.	'Who moved my Cheese?' by Spencer Johnson
2.	'Outliers' by Malcolm Gladwell
3.	'Emotional Intelligence' by Daniel Goleman 'Road Less Travelled' by Scott Peck M.
4.	'How to win friends and influence people' by Dale Carnegie
5.	'Who moved my Cheese?' by Spencer Johnson

Course Outcomes:

After the completion of this course, students will be able to:	
CO1	Display key soft skills expected by recruiters
CO2	Apply scientific methods to learn any skill quickly
CO3	Participate in Group Discussions and Personal Interviews effectively
CO4	Create effective resumes that impress interviewers (paper-based as well as video)
CO5	Apply professional etiquette to be displayed in various workplace scenarios

Soft Skills (0 Credit)

Description	Schedule	Conducted for
Activity-1	In regular class	20 marks
Activity-2	In regular class	20 marks
Activity-3	In regular class	20 marks
Activity-4	In regular class	20 marks
Activity-5	In regular class	20 marks
CIE		100 marks

Minimum marks to pass the course is 50% of total CIE.

No SEE component for Soft Skills.