PROGRAMME STRUCTURE

SHARDA SCHOOL OF ENGINEERING & TECHNOLOGY

Department of Computer Science & Applications

Master of Science
(Specilazation in Computer Science)

Programme Code: SET0127

Batch 2023-2026

Programme Structure									
Sharda School of Engineering & Technology									
Department of Computer Science & Applications									
MSc(CS)									
Batch: 2023-25							SEMESTER: I		
S. No.	Course Code	Paper ID	Course	Teaching Load			Credits		Type of Course
									1. CC - Core
									2. DSE - Interdisciplinary
									3. OE - Open Elective
									4. SEC - Skills Enhancement Courses
									5. AEC - Ability Enhancement Courses
				L	T	P			6. VAC-I - Value Added Courses
THEORY SUBJECTS									
1	MCT177		Database Management Systems	4	0	0	4		CC
2	MCT175		C Programming and File Handling	3	0	0	3		CC
3			OE-I	3	0	0	3		OE
	MCT169		Information Security and Cyber Laws						
	MCT176		Management Information Systems						
	MCT013		Essentials of Digital Marketing						
4	MCT273		Software Engineering	3	0	0	3		SEC
5	ARP106		Logic Building and Soft Skills	2	0	0	2		AEC
6	COC101		Food, Nutrition & Hygiene	2	0	0	2		VAC
Practical/Viva-Voce/Jury									
7	MCP177		Database Management Systems Lab	0	0	2	1		CC
8	MCP175		C Programming and File Handling Lab	0	0	2	1		CC
TOTAL CREDITS							19		

Programme Structure									
Sharda School of Engineering & Technology									
Department of Computer Science & Applications									
MSc(CS)									
Batch: 2023-25							SEMESTER: II		
S. No.	Course Code	Paper ID	Course	Teaching Load			Credits		Type of Course
									1. CC
									2. DSE
									3. OE
									4. SEC
									5. AEC
				L	T	P			6. VAC-I
THEORY SUBJECTS									
1	MCT105		Data Structure Using C	3	1	0	4		CC
2	MCT173		Application Programming in Python	4	0	0	4		CC2
3			OE-II	3	0	0	3		OE
	MCT271		Cloud Computing						
	MCT307		Cryptography and Network Security						
4	CSP395		Technical Writing	3	0	0	3		SEC
5	ARP104		Quantitative Aptitude and Verbal Ability Skill Building	2	0	0	2		AEC
6	COC201		First Aid and Health	2	0	0	2		VAC
Practical/Viva-Voce/Jury									
7	MCP265		Data Structure Lab	0	0	2	1		CC
8	MCP173		Application Programming in Python Lab	0	0	2	1		CC2
			TOTAL CREDITS				20		

Programme Structure									
Sharda School of Engineering & Technology									
Department of Computer Science & Applications									
MSc(CS)									
Batch: 2023-25							SEMESTER: III		
S. No.	Course Code	Paper ID	Course	Teaching Load			Credits		Type of Course
									1. CC
									2. DSE
									3. OE
									4. SEC
									5. AEC
				L	T	P			6. VAC-I
THEORY SUBJECTS									
1	MCT203		Design and Analysis of Algorithms	3	1	0	4		CC
2	MCT168		Object Oriented Programming with JAVA	4	0	0	4		CC2
3	MCT357		Computer Architecture and Organization	3	0	0	3		DSE
4			OE-III	3	0	0	3		OE
	MCT366		Big Data Analytics						
	MCT116		Artificial Intelligence and Machine Learning						
	MCL011		Android Application Development						
5	BBH203		Health and Hygiene	3	0	0	3		SEC
6	ARP307		Personality Development Decision Making and Negotiation Skills	2	0	0	2		AEC
Practical/Viva-Voce/Jury									
8	MCP168		Object Oriented Programming with JAVA Lab	0	0	2	1		CC
9	MCP267		Design and Analysis of Algorithms Lab	0	0	2	1		CC2
10	MCP358		Research Based Learning-1	0	0	2	0		Audit Course
			TOTAL CREDITS				21		

Programme Structure									
Sharda School of Engineering & Technology									
Department of Computer Science & Applications									
MSc(CS)									
Batch: 2023-25							SEMESTER: IV		
S. No.	Course Code	Paper ID	Course	Teaching Load			Credits		Type of Course
									1. CC
									2. DSE
									3. OE
									4. SEC
									5. AEC
				L	T	P			6. VAC-I
THEORY SUBJECTS									
1	MCT356		Project-2				12		CC
2			OE-IV	3	0	0	3		OE
	MCT306		C# with ASP.Net						
	MCT359		Introduction to PHP with MySQL						
	MCT360		Introduction to R Programming						
3	ARP308		Personality Development	4	0	0	4		AEC
Practical/Viva-Voce/Jury									
4	MCP306		C# with ASP .NET Lab	0	0	2	1		OE
	MCP359		Introduction to PHP with MySQL						
	MCP360		Introduction to R Programming Lab						
5	MCP361		Research Based Learning-2	0	0	2	0		Audit Course
			TOTAL CREDITS				20		

Course Modules

TERM-I

School: SSET		**Batch: 2023-25**	
Department		**Computer Science & Applications**	
Programme: MSc(CS)		**Current Academic Year: 2023-24**	
Semester:		**I**	
1	Course Code	MCT-177	
2	Course Title	Database Management Systems	
3	Credits	4	
4	Contact Hours (L-T-P)	4-0-0	
	Course Status		
5	Course Objective	1.Develop the ability to design & implement and manipulate databases. 2.Understand the importance of Normalization 3.Introduce various Protocols & schemes used in DBMS 4.Apply DBMS concepts to various examples and real-life applications.	
6	Course Outcomes	Students will be able to: **CO1.** Extend the knowledge & concepts of Database models and EER Diagram. **CO2.** Apply normalization techniques to reduce redundancy from the database. **CO3**.Appraise the basic issues of Transaction processing & deadlock. **CO4**. Identify the importance of concurrency control & Granularity **CO5**.Explain the concept of Recovery & Distributed System including parallel database and parallel sites. **CO6.**Design & develop databases for real life problems.	
7	Course Description	This course introduces database design and creation using a DBMS product. Emphasis is on, normalization, EER Diagram, data integrity, data modeling, and creation of simple tables, queries, reports, and forms. Upon completion, students should be able to design and implement normalized database including parallel and distributed structures by creating simple database tables, queries, reports, and forms.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Databases & Data Models:**	
	A	Concept & Overview of DBMS, Data Models, Database languages, Database Administrator, Database Users.	**CO1**
	B	Architecture of DBMS, Data Models, Data Modeling using Entity Relationship Model. Enhanced Entity Relationship diagram, Specialization, Generalization, Aggregation	
	C	Various Relational data model concepts, Unary Relational Operations, Binary Relational Operations, Set oriented operations	
	Unit 2	**Normalization in Design of Databases:**	
	A	Codd's Rules Functional Dependency, Different anomalies in designing a Database, Normalization first	

	B	Second and Third normal forms, Boyce Codd normal form,	**CO1, CO2, CO6**
	C	Multi valued dependency, Fourth normal forms, Inclusion dependencies, loss less join decompositions, Super key to candidate key reduction, Positive Closure	
	Unit 3	**Transaction Management and Deadlock**	
	A	Transaction processing system, schedule and recoverability,	**CO3, CO6**
	B	Testing of serializability, Serializability of schedules conflict & view serializable schedule	
	C	Dead Lock Phases: Avoidance, Detection	
	Unit 4	**Concurrency Control:**	
	A	Concurrency Control: Locking Techniques for concurrency control,	**CO3, CO4, CO6**
	B	time stamping protocols for concurrency control, multi-version schemes Time stamp based and time stamp ordering protocols	
	C	Granularity of Data Items and Multiple Granularity Locking	
	Unit 5	**Recovery & Distributed System**	
	A	Failure Classification, Recovery and Atomicity, Buffer Management	**CO5, CO6**
	B	Failure with Loss of Nonvolatile Storage Recovery Algorithm	
	C	Distributed Database Concepts database, Distributed Databases Types & Architectures, Parallel database architecture, parallel sites	
	Mode of examination	Theory	
	Weightage Distribution	CA / MTE / ETE	
		25% / 25% / 50%	
	Text book/s*	1. Korth, Silberschatz & Sudarshan, Database Concepts, Tata McGraw-Hill, Latest Edition	
	Other References	1.Elmasri, Navathe, Fundamentals of Database Systems, Pearson Education Inc. 2.Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to design, Implementation and Management, Pearson Education, Third Edition. 3.Jeffrey D. Ullman, Jennifer Windon, A first course in Database Systems, Pearson Education. 4.Date C.J., An Introduction to Database Systems, Addison Wesley.	

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	**CO1:** Extend the knowledge & concepts of Database models.	PO1, PO4, PO10, PSO1
2.	**CO2:** Apply normalization techniques to reduce redundancy from the database.	PO1, PO10, PSO1
3.	**CO3:** To appraise the basic issues of Transaction processing & deadlock.	PO1, PO2, PSO1
4.	**CO4**.Identify the importance of concurrency control & Granularity and quality for data analysis.	PO1, PO2
5	**CO5:** Explain the concept of Recovery & Distributed System.	PO1
6	**CO6:** Design & develop database for real life problems.	PO1, PO2, PO3, PO4, PO5, PO7, PO9, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name Data Base Management Systems (Course Code MCT177)

	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCT177 Data Base Management Systems		Domain Knowledge	Problem Analysis	Application Development	Modern Tool Usage	Innovation and Entrepreneurship	Environment and Sustainability	Personal and Professional Ethics	Communication	Project Management	Life-Long Learning		
	CO1	3	-	-	3	-	-	-	-	-	2	2	-
	CO2	3	-	-	-	-	-	-	-	-	2	1	-
	CO3	3	2	-	-	-	-	-	-	-	-	1	-
	CO4	3	1	-	-	-	-	-	-	-	-	-	-
	CO5	3	-	-	-	-	-	-	-	-	-	-	-
	CO6	3	3	3	3	3	-	2	-	3	3	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code/ Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCT177	3	2	3	3	3	-	2	-	3	2.3	1.5	2

Strength of Correlation:

1. Addressed to **Slight (Low=1) extent** **2.** Addressed to **Moderate (Medium=2) extent**
3. Addressed to **Substantial (High=3) extent**

School		**Sharda School of Engineering & Technology**	
Department		**Computer Science & Applications**	
Batch		**2023-2025**	
Programme		**MSc(CS), Academic Year: 2023-24**	
Semester		**I**	
1	Course Code	**MCT175**	Course Name: C Programming and File Handling
2	Course Title	C Programming and File Handling	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Core	
5	Course Objective	1. Learn basic programming constructs –data types, decision structures, control structures in C 2. learning logic aptitude programming in c language 3. Developing software in c programming	
6	Course Outcomes	Students will be able to: CO1: **demonstrate** the algorithm, Pseudo-code and flowchart for the given problem. CO2**: develop** better understanding of basic concepts of C programming. CO3: **create** and implement logic using array and function. CO4: **construct** and implement the logic based on the concept of strings and pointers. CO5: **apply** user-defined data types and I/O operations in file. CO6: **design** and develop solutions to real world problems using C.	
7	Course Description	Programming for problem solving gives the Understanding of C programming and implement code from flowchart or algorithm	
8	Outline syllabus		CO Mapping
	Unit 1	**Logic Building**	
	A	Flowchart: Elements, Identifying and understanding input/ output, Branching and iteration in flowchart	CO1
	B	Algorithm design: Problem solving approach (top down/bottom up approach)	CO1
	C	Pseudo Code: Representation of different construct, writing pseudo-code from algorithm and flowchart	CO1
	Unit 2	**Introduction to C Programming**	
	A	Introduction to C programming language, Data types, Variables, Constants, Identifiers and keywords, Storage classes	CO2, CO6
	B	Operators and expressions, Types of Statements: Assignment, Control, jumping.	CO2, CO6
	C	Control statements: Decisions, Loops, break, continue	CO2, CO6
	Unit 3	**Arrays and Functions**	
	A	Arrays: One dimensional and multi- dimensional arrays: Declaration, Initialization and array manipulation (sorting, searching).	CO3, CO6
	B	Functions: Definition, Declaration/Prototyping and Calling, Types of functions, Parameter passing: Call by value, Call by reference.	CO3, CO6
	C	Passing and Returning Arrays from Functions, Recursive Functions.	CO3, CO6
	Unit 4	**Pre-processors and Pointers**	
	A	Pre-processors: Types, Directives, Pre-processors Operators (#, ##, \) Macros: Types, Use, predefined Macros	CO4, CO6
	B	Pointer: Introduction, declaration of pointer variables, Operations on pointers: Pointer arithmetic, Arrays and pointers, Dynamic memory allocation.	CO4, CO6
	C	String: Introduction, predefined string functions, Manipulation of text data, Command Line Arguments.	CO4, CO6
	Unit 5	**User Defined Data Types and File Handling**	
	A	Structure and Unions: Introduction, Declaration, Difference, Application, Nested structure, self-referential structure, Array of structures, Passing structure in function.	CO5, CO6
	B	Files: Introduction, concept of record, I/O Streaming and Buffering, Types of Files: Indexed file, sequential file and random file,	CO5, CO6
	C	Creating a data file, Opening and closing a data file, Various I/O operations on data files: Storing data or records in file, adding records, Retrieving, and updating Sequential file/random file.	CO5, CO6

		Reading data from two files and write in third file at the same time, appending files and rewinding operations			
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Kernighan, Brian, and Dennis Ritchie. The C Programming Language			
	Other References	1. B.S. Gottfried - Programming with C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004. 2. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	**CO1:** demonstrate the algorithm, Pseudo-code and flow chart for the given problem.	**PO1, PO2, PO3, PO9, PSO1, PSO2**
2.	**CO2:** develop better understanding of basic concepts of C programming. .	**PO1, PO3, PO4, PO5, PO9, PSO1, PSO2**
3.	**CO3:** create and implement logic using array and function.	**PO1, PO3, PO4, PO9, PSO2**
4.	**CO4:** construct and implement the logic based on the concept of strings and pointers.	**PO1, PO3, PO4, PO9, PSO2**
5.	**CO5:** apply user-defined data types and I/O operations in file.	**PO1, PO3, PSO2**
6	**CO6:** design and develop solutions to real world problems using C.	**PO1, PO2, PO3, PO4, PO9, PSO1 PSO2**

PO and PSO mapping with level of strength for Course Name C Programming and File Handling (Course Code: MCT175)

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2
CO1	1	2	2	-	-	-	-	-	2	-	1	2
CO2	2	-	3	2	2	-	-	-	1	-	2	2
CO3	3	-	2	1	-	-	-	-	3	-	-	2
CO4	1	-	2	1	-	-	-	-	1	-	-	3
CO5	1	-	1	-	-	-	-	-	-	-	-	1
CO6	3	3	3	2	-	-	-	-	2	-	2	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCT175	C Programming and File Handling	1.83	.83	2.17	1	.33				1.50		.83	2.17

Strength of Correlation

1. Addressed to **Slight (Low=1) extent** **2.** Addressed to **Moderate (Medium=2) extent**
3. Addressed to **Substantial (High=3) extent**

School:		**Sharda School of Engineering & Technology**			
Department		**Computer Science & Applications**			
Academic Year		**2023-24**			
Programme:		**MSc(CS)**			
Semester:		**I**			
1	Course Code	MCT169			
2	Course Title	Information Security and Cyber Laws			
3	Credits	3			
4	Contact Hours (L-T-P)	3	0	0	
	Course Status	Elective			
5	Course Objective	Enable learner to understand, explore, and acquire a critical understanding Cyber Law. Give learners in depth knowledge of Information Technology Act and legal frame work of Right to Privacy, Data Security, Data Protection and tools			
6	Course Outcomes	• On successful completion of this module students will be able to • CO1: Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cybercrimes for example, child pornography etc. that are taking place via the Internet • CO2: Explore the legal and policy developments in various countries to regulate Cyberspace • CO3: Formulate various security measures for cyber-attacks. • CO4: Apply the principles in real life situations. • CO5: Identify various Cybercrimes and take necessary actions. • CO6: Assess the various online activities.			
7	Course Description	This course introduces aspects of cyber security, encompassing the principles, to analyze the data, identify the problems, and choose the relevant countermeasures to apply.			
8	Outline syllabus				CO Mapping
	Unit 1	Introduction to Cyber Security			
	A	Understanding Computers, Internet and Cyber Laws, information security legal liabilities,			CO1, CO2
	B	intellectual property, defamation, privacy concerns, censorship, cyber fraud, e – commerce law,			CO5, CO6, CO3
	C	insurance law, the clash of laws, cyber law dispute resolution, the law of linking, cyber crime			CO6, CO4, CO2
	Unit 2	Intellectual rights			
	A	Protection of Intellectual Property Rights in Cyber Space in India,			CO1, CO2. CO3
	B	Compensation and Adjudication of Violations of Provisions of It Act and Judicial Review, Some important Offenses under the Cyber Space Law and the Internet in India,			CO4, CO5, CO6
	C	Other Offenses under the Information Technology Act in India			CO1, CO6, CO3, CO4
	Unit 3	Role of Evidences and Rules			
	A	The Role of Electronic Evidence and the Miscellaneous Provisions of the IT Act,			CO1, CO2, CO4

	B	Legal Aspects of Electronic Records/Digital Signatures,			CO6, CO3, CO1
	C	The Rules and Regulations of Certifying Authorities in India			CO3, CO4, CO6, CO5
	Unit 4	Cyber Space Laws			
	A	International Efforts Related to Cyber Space Laws,			CO1, CO2, CO6
	B	Fundamental Jurisdiction Principles Under International Law, Classic U.S. Jurisdiction			CO2, CO4, CO6
	C	Principles, Council of Europe convention on cyber crimes			CO1, CO3, CO5
	Unit 5	Tools			
	A	Cyber Check, True Back,			CO1, CO2, CO6
	B	Hasher, Email Tracer			CO1. CO2, CO6, CO5
	C	Pasco, Nmap, Bin Text			CO2, CO3, CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Cyber Law and IT Protection, Chander Harish Handbook of Information Security, Hossein Bid gol			
	Other References	1. Introduction to Information Security and Cyber Laws by Surya Prakash Tripathi			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cybercrimes for example, child pornography etc. that are taking place via the Internet	PO1, PO2, PO3, PO7, PO10, PSO1
2.	CO2: Explore the legal and policy developments in various countries to regulate Cyberspace	PO1, PO2, PO6, PO7, PO8, PO10, PSO1, PSO2
3	CO3: Formulate various security measures for cyber-attacks.	PO1, PO2, PO6, PO7, PO8, PO10, PSO1, PSO2
4	CO4: Apply the principles in real life situations.	PO1, PO2, PO3, PO4, PO5, PO10, PSO1
5	CO5: Identify various Cybercrimes and take necessary actions.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO9, PO10, PSO1, PSO2
6	CO6: Assess the various online activities.	PO1, PO2, PO3, PO4, PO5, PO7 PO9, PO10, PSO1

PO and PSO mapping with level of strength for Course Name Information Security and Cyber Laws (Course Code MCT169)

Course Code-Course Name	CO's	PO1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCT 169 Information Security and Cyber Laws	**CO1**	2	2	3				3			3	2	
	CO2	3	3				2	2	3		3	3	2
	CO3	2	2				2	2	2		2	3	3
	CO4	2	2	2	3	3					3	2	
	CO5	2	2	2	2	2	2	2		2	2	2	3
	CO6	3	2		2	2		3		3	2	2	

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2
MCT 169	**Information Security and Cyber Laws**	2.3	2.1	2.3	2.3	2.3	2	2.4	2.5	2.5	2.4	2.3	2.6

Strength of Correlation

1. Addressed to **Slight (Low=1) extent** **2.** Addressed to **Moderate (Medium=2) extent**
3. Addressed to **Substantial (High=3) extent**

Syllabus: Management Information System

School: SSET		**Batch: 2023-2025**	
Department		**Computer Science & Applications**	
Programme: MSc(CS)		**Current Academic Year: 2023-24**	
Semester:		**I**	
1	Course Code	MCT176	
2	Course Title	Management Information System	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Elective	
5	Course Objective	**The objective of this course is to:** 1. To understand the basic principles and working of management information systems. 2. Describe the role of information technology and information systems in business. 3. To give an overall perspective of the importance of application of internet technologies in business administration.	
6	Course Outcomes	**At the end of the course student will be able to:** **CO1**: Relate the basic concepts and technologies used in the field of management information systems. (K2, K6) **CO2**: Compare the processes of developing and implementing information systems (K6, K3) **CO3**: Outline the role of the ethical, social, and security issues of information systems(K3) **CO4:** Translate the role of information systems in organizations, the strategic management processes, with the implications for the management. (K5) **CO5:** Interpret and recommend the use information technology to solve business problems (K5) **CO6:** Apply a framework and process for aligning organization's IT objectives with business strategy. (K6)	
7	Course Description	This course introduces developing and managing efficient and effective understanding of management information system that requires understanding the management fundamentals and techniques.	
8	Outline syllabus		**CO Mapping**
	Unit 1	**BASIC CONCEPTS OF INFORMATION SYSTEM**	
	A	Role of data and information, Organization structures	CO1, CO6
	B	Business Process, Systems Approach	CO1, CO6
	C	Introduction to Information Systems	CO1, CO6
	Unit 2	**TYPES OF INFORMATION SYSTEM**	
	A	Resources and components of Information System, integration and automation of business functions and developing business models	CO1, CO2, CO6
	B	Role and advantages of Transaction Processing System, Management Information System	CO1, CO2, CO6
	C	Expert Systems and Artificial Intelligence, Executive Support Systems and Strategic Information Systems.	CO1, CO2, CO6
	Unit 3	**BASICS OF MANAGEMENT INFORMATION SYSTEM**	
	A	MIS: Definition – Characteristics and basic requirements of MIS	CO3, CO6
	B	Structure of MIS-Approaches to MIS development	CO3, CO6
	C	Computerized MIS- Pre-requisites of an effective MIS-Limitations of MIS	CO3, CO6
	Unit 4	**DECISION MAKING PROCESS**	
	A	Programmed and Non- Programmed decisions	CO4

	B	Decision Support Systems		CO4
	C	Models and approaches to DSS		CO4
	Unit 5	**INTRODUCTION TO ENTERPRISE MANAGEMENT TECHNOLOGIES**		
	A	Business Process Reengineering		CO5
	B	Total Quality Management and Enterprise Management System		CO5
	C	Understanding of ERP, SCM, CRM and Ecommerce.		CO5
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		25%	25%	50%
	Text book/s*	1. Kenneth C. Laudon and Jane P. Laudon: Management Information System, Managing the Digital Firm, Pearson Education, 14th Global edition, 2016, ISBN:9781292094007. 2. James A. O' Brien, George M. Marakas: Management Information Systems, Global McGraw Hill, 10th Edition, 2011, ISBN: 978-0072823110.		
	Other References	1. Goyal, D.P.: "Management Information System", MACMILLAN India Limited, New Delhi, 2008. 2. Mahadeo Jaiswal, Monika Mital: "Management Information System", Oxford University Press, New Delhi, 2008. 3. Murthy C.S.V.: "Management Information System", Himalaya Publications, New Delhi, 2008.		

CO and PO Mapping

S. No.	Course Outcome (CO)	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	Relate the basic concepts and technologies used in the field of management information systems.	PO1, PO4, PO8, PO9, PO10
2.	Compare the processes of developing and implementing information systems.	PO1, PO2, PO4, PO8, PO10
3.	Outline the role of the ethical, social, and security issues of information systems.	PO1, PO2, PO3, PO4, PO8, PO10
4.	Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.	PO1, PO2, PO3, PO4, PO8
5	Interpret and recommend the use of information technology to solve business problems.	PO1, PO2, PO3, PO4, PO10
6	Apply a framework and process for aligning organization's IT objectives with business strategy.	PO1, PO2, PO3, PO4, PO5, PO6, PO9, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name: Management Information System

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	-	-	3	-	-	-	2	2	3	-	-
CO2	3	3	-	3	-	-	-	3	-	2	-	-
CO3	3	3	3	3	-	-	-	3	-	2	-	-
CO4	2	2	2	3	-	-	-	2	-		-	-
CO5	2	2	2	3	-	-	-	-	-	2	-	-
CO6	2	3	3	3	2	2	2	3	3	3	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code/ Name	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCT176/MIS	2.5	2.6	2.5	3	2	2	2	2.6	2.5	2.4	2	2

Strength of Correlation:1. Addressed to **Slight (Low=1) extent** **2.** Addressed to **Moderate (Medium=2) extent**

School:		**Sharda School of Engineering & Technology**		
Department		**Computer Science & Applications**		
Programme:		**MSc(CS), Academic Year: 2023-24 Batch: 2023-2026**		
Semester:		**I**		
1	Course Code	MCT013		
2	Course Title	**Essentials of Digital Marketing**		
3	Credits	3		
4	Contact Hours (L-T-P)	3	0	0
	Course Status	Elective		
5	Course Objective	The objectives of this Course are: 1. Today's marketer has to be aware of the digital Market interventions and this course has been designed keeping in mind the requirement of industry on one end and competence enhancement on the other. 2. At the end of this course you will be equipped with the skill to understand and initiate digital marketing.		
6	Course Outcomes	After Successful completion of this course the student will be able to: CO1: infer digital marketing practices, inclination of digital consumers and their behaviours. CO2: discover various search engine optimization techniques for digital marketing analysis. CO3: determine the value of integrated marketing campaigns across SEO, Paid Search, Social, Mobile, Email, Display Media, Marketing Analytics. CO4: develop understanding of the latest digital practices for social media marketing and promotions CO5: distinguish among the different technology used in Digital Marketing CO6: construct insights on building organizational competency by way of digital marketing practices and cost considerations.		
7	Course Description	The primary objective of this module is to examine and explore the role and importance of digital marketing in today's rapidly changing business environment. It also focuses on how digital marketing can be utilized by organizations and how its effectiveness can be measured.		
8	Outline syllabus			CO Mapping
	Unit 1	**Introduction to Digital Marketing**		
	A	What is digital marketing		CO1
	B	Aligning Internet with Business Objectives		CO1
	C	User Behaviour & Navigation		CO1
	Unit 2	**Search Engine Optimization**		
	A	Stakeholders in Search		CO2
	B	On & off-page Optimisation		CO2
	C	Meta Tags, Layout, Content updates Inbound Links & Link Building		CO2
	Unit 3	**Web Site Analytics**		
	A	Goal Configuration &Funnels		CO3
	B	Intelligence Reporting		CO3
	C	Conversions, Bounce Rate, Traffic Sources, Scheduling		CO3
	Unit 4	**Social Media Marketing**		
	A	What is Social Media Marketing?		CO4, CO6
	B	Overview of Facebook, Twitter, LinkedIn, Blogging, YouTube and Flickr		CO4, CO6

	C	Building Brand Awareness Using Social Media			CO4, CO6
	Unit 5	**Digital Marketing Strategy**			
	A	Understanding strategy			CO5, CO6
	B	Email Marketing, Affiliate marketing Mobile Marketing,			CO5, CO6
	C	Display Advertising			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	Digital Marketing: Global Strategies from the World's Leading Experts Jerry Wind , Vijay Mahajan			
	Other References	The Essentials of Digital Marketing Kathryn Waite and Rodrigo Perez-Vega			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1. Infer digital marketing practices, inclination of digital consumers and their behaviours.	PO1, PO2, PO7, PO10 PSO1, PSO2
2.	CO2: discover various search engine optimization techniques for digital marketing analysis.	PO1, PO2, PO3, PO4, PO7, PO10, PSO1, PSO2
3.	CO3. Determine the value of integrated marketing campaigns across SEO, Paid Search, Social, Mobile, Email, Display Media, and Marketing Analytics.	PO1, PO2, PO3, PO4, PO7, PO10, PSO1, PSO2
4.	CO4. develop understanding of the latest digital practices for social media marketing and promotions	PO1, PO2, PO3, PO4, PO7, PO10, PSO1, PSO2
5.	CO5. distinguish among the different technology used in Digital Marketing	PO1, PO2, PO4, PO7, PO10, PSO1, PSO2
6.	CO6. Construct insights on building organizational competency by way of digital marketing practices and cost considerations.	PO1, PO2, PO3, PO4, PO7, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Essentials of Digital Marketing (Course Code MCT013)

Course Code_ Course Name	CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCT013 Essentials of Digital Marketing	CO1	1	2					1			2	2	2
	CO2	2	2	2	2			1			2	2	2
	CO3	2	2	2	2			2			2	3	3
	CO4	1	2	1	1			2			2	3	3
	CO5	1	1		1			1			2	2	1
	CO6	1	2	1	1			1			2	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO 2
MCT013	Essentials of Digital Marketing	1.5	1.8	1	1.2	--	--	1.4	--	--	2	2.4	2.1

Strength of Correlation

1. Addressed to **Slight (Low=1) extent** **2.** Addressed to **Moderate (Medium=2) extent**
3. Addressed to **Substantial (High=3) extent**

School:		**Sharda School of Engineering & Technology**		
Department		**Computer Science & Applications**		
Batch		**2023-2026**		
Programme:		**MSc(CS), Academic Year:2023-24**		
Semester:		I		
1	Course Code	MCT273		
2	Course Title	Software Engineering & Testing		
3	Credits	3		
4	Contact Hours (L-T-P)	3	0	0
	Course Status	Core		
5	Course Objective	The course will prepare our students to be successful professionals in the field with solid fundamental knowledge of software engineering. Course focuses on Utilizing and exhibiting strong communication and interpersonal skills when functioning as members and leaders of multi-disciplinary teams. This Course allows students to apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes.		
6	Course Outcomes	Students will be able to: ● CO1: Choose software model to apply on particular kind of project. ● CO2: Summarize various requirements for the Application under development ● CO3: Make use of Unified Modeling Language in software specification documents ● CO4: Inspect code using various testing techniques to meet user needs as per SRS ● CO5: Develop and deliver quality software as an individual or as part of a multidisciplinary team ● CO6: Adapt process of designing, constructing, and testing end user applications that will satisfy user needs		
7	Course Description	This course covers the software development process from requirements elicitation and analysis, through specification and design, to implementation, integration, testing, and maintenance (evolution).		
8	Outline syllabus			CO Mapping
	Unit 1	**Software Engineering and process models**		
	A	Introduction to software engineering, Importance of software, Software characteristics, Software applications, Software crisis and its causes.		CO1
	B	Software Process models: Waterfall model, Incremental model, Prototyping Model, Spiral Model, V model		CO1
	C	Agile Process models: Extreme Programming (XP), Adaptive Software Development (ASD), Scrum		CO1
	Unit 2	**Software requirement Specification**		
	A	Requirement Engineering process, Elicitation techniques, Review and Management of User Needs, Types of Requirements		CO2
	B	Feasibility study, DFD, data dictionary, decision tables		CO2
	C	SRS Document, IEEE standards for SRS with examples.		CO2
	Unit 3	**Software Design**		
	A	Design Concepts, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design		CO3
	B	Effective modular design: Functional independence, Cohesion, Coupling, Design documentation		CO3

	C	UML Diagrams and Tools: Introduction to UML Diagrams, Use Case, Object and Class, Interaction diagram: Sequence & Collaboration, Introduction to Rational Rose tool			CO3, CO6
	Unit 4	**Software Testing**			
	A	Fundamental of testing: Objectives, principles, myths and facts, Error, Mistake, Bug, Fault and Failure, limitations of testing			CO4
	B	Levels of testing: Unit Testing, Integration Testing, System Testing, Acceptance Testing: Alpha & Beta Testing, Integration techniques			CO4, CO6
	C	White Box Testing, Black Box Testing, Verification and Validation, Test case designing, Coding Guidelines, Debugging			CO4, CO6
	Unit 5	**Maintenance & Quality Management**			
	A	Introduction to Maintenance, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance			CO5, CO6
	B	Quality Concepts: Quality, Quality Control, Cost of Quality, Software Quality Assurance, SQA Plan, Software Reliability: Measures of Reliability and Availability, Software Safety			CO5, CO6
	C	Statistical Software Quality Assurance: Six Sigma, The ISO 9000 Quality Standards, Capability Maturity Model			CO5, CO6
	Mode of examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Pressman R S, "Software Engineering: A Practitioners Approach", McGraw Hill.			
	Other References	1. Sommerville, Ian. "Software Engineering", Pearson (Latest Ed). 2. Schaum's Series, "Software Engineering" TMH			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Choose software model to apply for particular kind of project.	PO1, PO2, PO7, PO8, PO9, PO10, PSO1, PSO2
2.	CO2: Summarize various requirements for the Application under development.	PO1, PO2, PO3, PO7, PO8, PO9, PO10, PSO1, PSO2
3.	CO3: Make use of Unified Modeling Language in software specification documents;	PO1, PO2, PO3, PO4, PO7, PO8, PO9, PO10, PSO1, PSO2
4.	CO4: Inspect code using various testing techniques to meet user needs as per SRS.	PO1, PO2, PO3, PO4, PO7, PO8, PO9, PO10, PSO1
5.	CO5: Develop and deliver quality software as an individual or as part of a multidisciplinary team.	PO1, PO2, PO3, PO7, PO8, PO9, PO10, PSO1
6.	CO6: Adapt process of designing, constructing, and testing end user applications that will satisfy user needs	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name Software Engineering & Testing **(Course Code** MCT273**)**

Course Code_ MCT 273 Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCT 273 Software Engineering & Testing	CO1	3	3	-	-	-	-	3	3	2	1	3	2
	CO2	3	3	2	-	-	-	3	3	3	1	3	2
	CO3	3	3	3	3	-	-	3	3	3	1	3	3
	CO4	3	3	2	2	-	-	3	3	3	1	3	-
	CO5	3	3	2	-	-	-	3	3	3	1	3	-
	CO6	3	3	2	3	2	2	3	3	3	3	3	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCT273	Software Engineering & Testing	3	3	2.2	2.6	2	2	3	3	2.8	1.3	3	2.25

Strength of Correlation

1. Addressed to **Slight (Low=1) extent** **2.** Addressed to **Moderate (Medium=2) extent**

3. Addressed to **Substantial (High=3) extent**

School: SSET		**Batch :** 2023-2025
Programme: MSc(CS)		**Academic Year:** 2023-2024
Semester		I
1	Course Code	**ARP 106**
2	Course Title	**Logic Building and Soft Skills**
3	Credits	2
4	Contact Hours (L-T-P)	1-0-2
	Course Status	Active
5	Course Objective	To enhance holistic development of students and improve their employability skills. To provide a 360 degree exposure to learning elements of Business English readiness program, behavioural traits, achieve softer communication levels and a positive self-branding along with augmenting numerical and altitudinal abilities. To step up skill and upgrade students' across varied industry needs to enhance employability skills. By the end of this semester, a student will have entered the threshold of his/her 1st phase of employability enhancement and skill building activity exercise.

6	Course Outcomes	After completion of this course, students will be able to: CO1: Ascertain a competency level through Building Essential Language and Life Skills CO2: Build positive emotional competence in self and learn GOAL Setting and SMART Goals techniques CO3: Apply positive thinking, goal setting and success-focused attitudes, time Management, which would help them in their academic as well as professional career CO4: Acquire satisfactory competency in use of aptitude, logical and analytical reasoning CO5: Develop strategic thinking and diverse mathematical concepts through building number puzzles CO6: Demonstrate an ability to apply various quantitative aptitude tools for making business decisions	
7	Course Description	This Level 1 blended training approach equips the students for Industry employment readiness and combines elements of soft skills and numerical abilities to achieve this purpose.	
8	syllabus – **ARP 106**		
	Unit 1	**BELLS (Building Essential Language and Life Skills)**	**CO Mapping**
	A	*Know Yourself*: Core Competence. A very unique and interactive approach through an engaging questionnaire to ascertain a student's current skill level to design, architect and expose a student to the right syllabus as also to identify the correct TNI/TNA levels of the student.	CO1
	B	Techniques of Self Awareness | Self Esteem & Effectiveness| Building Positive Attitude | Building Emotional Competence	CO1, CO2
	C	Positive Thinking & Attitude Building | Goal Setting and SMART Goals – Milestone Mapping | Enhancing L S R W G and P (Listening Speaking Reading Writing Grammar and Pronunciation) |	CO1, CO2,CO3
	Unit 2	**Introduction to APTITUDE TRAINING- Reasoning- Logical/ Analytical**	
	A	Syllogism | Letter Series | Coding, Decoding , Ranking & Their Comparison Level-1	CO4
	B	Number Puzzles	CO5
	C	Selection Based On Given Conditions	CO5
	Unit 3	**Quantitative Aptitude**	
	A	Number Systems Level 1 | Vedic Maths Level-1	CO6
	B	Percentage ,Ratio & Proportion | Mensuration - Area & Volume |Algebra	CO6
	Unit 4	**Verbal Abilities - 1**	
	A	Reading Comprehension	CO1
	B	Spotting the Errors	CO2
	Unit 5	**Time & Priority Management**	
	A	Steven Covey Time Management Matrix	CO3
	B	Creating Self Time Management Tracker	CO3
	Weightage Distribution	*CA MTE ETE* ***25% 25% 50%***	
	Text book/s*	*Wiley's Quantitative Aptitude-P Anand* | ***Quantum CAT – Arihant Publications*** | ***Quicker Maths- M. Tyra*** | *Power of Positive Action (English, Paperback, Napoleon Hill) | Streets of Attitude (English, Paperback, Cary Fagan, Elizabeth Wilson) The 6 Pillars of self-esteem and awareness – Nathaniel Brandon | Goal Setting (English, Paperback, Wilson Dobson*	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	1	-	-	-	1	3	-	-
CO2	-	-	-	-	1	-	-	-	1	3	-	-
CO3	-	-	-	-	1	-	-	-	1	3	-	-
CO4	-	-	-	-	-	-	-	-	1	2	-	-
CO5	1	-	-	-	-	-	-	-	1	2	-	-
CO6	1	-	-	-	-	-	-	-	1	2	-	-

School: SSET		**Batch: 2023-25**	
Department		**Computer Science & Applications**	
Programme: MSc(CS)		**Current Academic Year: 2023-24**	
Semester:		**I**	
1	Course Code	MCP177	
2	Course Title	Database Management Systems Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	• To Develop efficient SQL programs to access Oracle databases • Build database using Data Definition Language Statements • Perform operations using Data Manipulation Language statements like Insert, Update and Delete	
6	Course Outcomes	By the end of this course you will be able to: CO1: Understand the concept of SQL commands in DBMS. CO2: Create & Perform operations using DDL, DML & Grouping Clauses. CO3: Manipulate your data using Sub- queries & Joins CO4: Implementation of Trigger & Cursors CO5: Solve problems using Procedures & Functions CO6: Design & develop database for real life applications.	
7	Course Description	An introduction to the design and creation of relational databases. Create database-level applications and tuning robust business applications. Lab sessions reinforce the learning objectives and provide participants the opportunity to gain practical hands-on experience.	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based DDL, DML commands**	
		Classification SQL, Data types of SQL/Oracle, create table, alter table and drop table, INSERT, SELECT, UPDATE & DELETE command	CO1, CO2
	Unit 2	**Practical based on Grouping Clauses GROUP BY ORDER BY & GROUP BY HAVING**	
		Briefly explain Group by, order by, having clauses with examples. **Aggregate functions:** sum, avg, count, max, min	CO1, CO2
	Unit 3	**Practical based on Sub- queries, JOINS &**	
		Related example of Sub- queries, Joins and related examples,	CO1, CO3
	Unit 4	**Trigger & Cursors**	CO4
		Program related with Trigger & Cursors	
	Unit 5	**Procedures & Functions**	CO5, CO6
		Applying Procedures & Functions	

		Develop Real life Applications			
Value Added Practical: Applications such as Banking, Library, Payroll, University etc.					
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	CE (Viva)	ETE	
		25%	25%	50%	
	Text book/s*	1. Korth, Silberschatz& Sudarshan, Database Concepts, Tata McGraw-Hill			
	Other References	1. Elmasri, Navathe, Fundamentals of Database Systems, Pearson Education Inc. 2. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to design, Implementation and Management, Pearson Education, Latest Edition. 3. Jeffrey D. Ullman, Jennifer Windon, A first course in Database Systems, Pearson Education. 4. https://www.slideshare.net/stalinjothi/dbms-lab-manual-126808730			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Understand the concept of SQL commands in DBMS.	PO1, PO2, PO3, PO10, PSO1
2.	CO2 Create & Perform operations using DDL, DML& Grouping Clauses.	PO1, PO2, PO3, PO10, PSO1
3.	CO3: Manipulate your data using Sub- queries & Joins.	PO1, PO2, PO3, PO10, PSO1
4.	CO4: Implementation of Trigger & Cursors	PO1, PSO2
5	CO5: Solve problems using Procedures & Functions.	PO1, PO2, PSO2
6	CO6: Design & develop database for real life problems.	PO1, PO2, PO3, PO4, PO5, PO7, PO9, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name: Data Base Management Systems Lab (MCP177)

	COs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCP 177/ DBMS		Domain Knowledge	Problem Analysis	Application Development	Modern Tool Usage	Innovation and Entrepreneurship	Environment and Sustainability	Personal and Professional Ethics	Communication	Project Management	Life-Long Learning		
	CO1	3	1	1	-	-	-	-	-	-	1	1	-
	CO2	3	1	1	-	-	-	-	-	-	1	1	-
	CO3	3	2	1	-	-	-	-	-	-	1	1	-
	CO4	3	-	-	-	-	-	-	-	-	-	-	1
	CO5	3	2	-	-	-	-	-	-	-	-	-	1
	CO6	3	3	3	3	2	-	2	-	3	2	2	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code/ Name	PO 1	PO2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO10	PSO1	PSO2
MCP177	3	1.8	1.5	3	2	-	2	-	3	1.5	1.5	1.7

Strength of Correlation

1. Addressed to **Slight (Low=1) extent** **2.** Addressed to **Moderate (Medium=2) extent**

3. Addressed to **Substantial (High=3) extent**

Syllabus: C Programming and File Handling Lab

School	**Sharda School of Engineering & Technology**
Department	**Computer Science & Applications**

Program		**MSc(CS), Academic Year: 2023-24**			
Semester		**I**			
1	Course Code	MCP175			
2	Course Title	C Programming and File Handling Lab			
3	Credits	1			
4	Contact Hours (L-T-P)	0-0-2			
	Course Status	Compulsory			
5	Course Objective	1. Learn basic programming constructs –data types, decision structures, control structures in C 2. learning logic aptitude programming in c language 3. Developing software in c programming			
6	Course Outcomes	Students will be able to: CO1: **Implement** core concept of c Programming CO2: **develop** programs using Array and String CO3: **create** Functions for any problem CO4: **Use** Union and Structure to write any program CO5: **implement** concept of Pointers CO6**: design** a real-world problem with the help of c programming			
7	Course Description	Programming for problem solving gives the Understanding of C programming and implement code from flowchart or algorithm			
8	Outline syllabus				CO Mapping
	Unit 1	**Logic Building**			**CO1, CO6**
		Draw flowchart for finding leap year			
		Write a c Program to Add Two Integers			
		Write a program to create a calculator			
	Unit 2	**Introduction to C Programming**			**CO2, CO6**
		Write a c program to convert length meter to cm			
		Write a c program to convert temp			
		Write a c program to swap two numbers			
	Unit 3	**Arrays and Functions**			**CO3, CO6**
		Write a c program to calculate the average using arrays			
		Write a c program to find the largest element of the array			
	Unit 4	**Pre-processors and Pointers**			**CO4, CO6**
		Write a c program to swap two values using pointers			
		Write a c program to find largest number from array using pointers			
	Unit 5	**User Defined Data Types and File Handling**			**CO5, CO6**
		Write a c program to store information of a student using structure			
		Write a c program to store information of a student using union			
	Mode of examination	Practical			
	Weightage Distribution	CA	CE(Viva)	ETE	
		25%	25%	50%	
	Text book/s*	1. Kernighan, Brian, and Dennis Ritchie. The C Programming Language			

	Other References	1. B.S. Gottfried - Programming with C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004. 2. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999	

PO and PSO mapping with level of strength for Course Name: C Programming and File Handling Lab **(MCP175)**

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCP175 Programming for problem solving Lab	CO1	2	-	3	2	2	-	-	-	2	-	3	2
	CO2	3	-	3	2	2	-	-	-	3	-	3	3
	CO3	2	-	3	1	2	-	-	-	2	-	2	3
	CO4	1	-	2	1	1	-	-	-	2	-	2	2
	CO5	2	-	3	2	2	-	-	-	3	-	3	2
	CO6	3	-	3	3	1	-	-	-	2	-	2	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCP175	C Programming and File Handling Lab	2.33		2.83	1.83	1.67	-	-	-	2.33	-	2.50	2.50

Strength of Correlation

1. Addressed to **Slight (Low=1) extent** **2.** Addressed to **Moderate (Medium=2) extent**
3. Addressed to **Substantial (High=3) extent**

TERM-II

School:		**Sharda School of Engineering & Technology**		
Department		**Computer Science & Applications**		
Programme:		**MSc(CS)**		
Semester:		**II**		
1	Course Code	MCT105		
2	Course Title	Data Structure using C		
3	Credits	4		
4	Contact Hours (L-T-P)	3	1	0
	Course Status	Core		
5	Course Objective	• To impart the basic concepts of data structures and algorithms. • To understand concepts about searching and sorting techniques. • To understand basic concepts about stacks, queues, lists trees and graphs. • To understand writing algorithms and step by step approach in solving problems with the help of fundamental data structures. • To understand the knowledge of algorithm design strategies. • To enable students to analyse time and space complexity.		
6	Course Outcomes	• CO1: **Analyse** algorithms and their correctness. • CO2: **Describe** stack, queue and linked list operation. • CO3: **Demonstrate** the knowledge of tree and graphs concepts. • CO4: **Apply** important algorithmic design paradigms and methods of analysis • CO5: **Develop** the capability to choose appropriate algorithm design techniques for solving problems. • CO6: **Analyse** the performance of algorithms.		
7	Course Description	This course starts with an introduction to data structures with its classification, efficiency of different algorithms, array and pointer-based implementations and Recursive applications. As the course progresses the study of Linear and Non-Linear data structures are studied in detail. This Course also deals with the concept of searching and sorting methods. Specifically, it discusses recurrence relations, and illustrates their role in asymptotic and probabilistic analysis of algorithms. It covers in detail greedy strategies, divide and conquer techniques, dynamic programming and illustrates them using a number of well-known problems and applications.		
8	Outline syllabus			CO Mapping
	Unit 1	**Introduction**		
	A	Data Structure – Definition, Operations, Abstract Data Types,		**CO1, CO6**
	B	Algorithm – Definition, Complexity		**CO1, CO6**
	C	Asymptotic notations, Time and Space complexity		**CO1, CO6**
	Unit 2	**Arrays and Linked List**		
	A	Concept of Arrays, Single dimensional array, Two-dimensional array, storage strategy of multidimensional arrays (Row Major/ Column Major), Index Formula for single and multidimensional Array,		**CO2, CO6**
	B	Operations on arrays with Algorithms (Insertion, deletion), Introduction to linked list and double linked list, Representation of linked lists in Memory, traversing a linked list, searching linked list, Insertion and deletion into linked list		**CO2, CO6**
	C	Application of linked lists, doubly linked lists, Traversing a doubly linked lists, Insertion and deletion into doubly linked lists		**CO2, CO6**

	Unit 3	**Stack and Queue**			
	A	Introduction to stacks, Representation of stacks,			**CO3, CO6**
	B	Implementation of stacks using Array & Link List, Uses of stacks, Introduction to queues,			**CO3, CO6**
	C	Implementation of queues (with algorithm), Circular Queues, De-queues, Recursion			**CO3, CO6**
	Unit 4	**Tree and Graph**			
	A	Concept of Trees, Concept of representation of Binary tree, Binary search trees Traversing Binary Trees (Pre order, Post order and In order),			**CO4, CO5, CO6**
	B	Searching, inserting and deleting binary search trees, AVL Tree, B-Tree,			**CO4, CO5, CO6**
	C	Introduction to graphs, types of graphs, Breadth first search, Depth first search			**CO4, CO5, CO6**
	Unit 5	**Sorting and Searching**			
	A	Introduction, Search algorithm (Linear and Binary),			**CO4, CO5**
	B	Concept of sorting, Sorting algorithms (Bubble Sort, Insertion Sort, Quick Sort, Selection Sort, Merge Sort, Heap Sort, Radix Sort) and their comparisons,			**CO4, CO5**
	C	Complexity Analysis of Sorting Algorithms.			**CO4, CO5**
	Mode of examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Data Structure with C, Seymour Lipschutz, TMH 2. Data Structures using C. Reema Thareja , Oxford 2. Cormen et al., "Introduction of Computer Algorithms", Prentice Hall India 3. Data Structures, 2/e, Richard F, Gilberg, Forouzan, Cengage 4. Data structures and algorithm analysis in C.			
	Other References	1. Data Structures and Algorithms, 2008, G. A. V. Pai, TMH 2. Classic Data Structures, 2/e, Debasis, Sarnanta, PHI,2009 3. Fundamentals of Data Structure in C, 2le,' Horowitz, Sahni, Anderson Freed, University Prees 4. Hopcroft A, The Design and Analysis Computer Algorithms, Addison Wesley			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	**Analyse** algorithms and their correctness.	PO1, PO2, PO3, PO6, PO8, PO9, PO10, PSO1, PSO2
2.	**Summarize** searching and sorting techniques	PO1, PO2, PO3, PO4, PO5, PO10, PSO1, PSO2
3.	**Describe** stack, queue and linked list operation.	PO1, PO2, PO3, PO5, PO10, PSO1, PSO2
4.	**Apply** important algorithmic design paradigms and methods of analysis	PO1, PO2, PO3, PO5, PO10, PSO1, PSO2
5.	**Develop** the capability to choose appropriate algorithm design techniques for solving problems.	PO1, PO2, PO3, PO6, PO9, PO10, PSO1, PSO2
6.	**Analyse** the performance of algorithms	PO1, PO2, PO3,PO4,PO5,PO8,PO9,PO10,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Data Structures using C (MCT105)

Course Code_ Course Name	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCT105_Data Structure Using C	**CO1**	3	1	3	-	-	2		2	1	2	1	2
	CO2	3	3	2	1	1	-				2	3	1
	CO3	2	1	2	2	2	-				3	3	2
	CO4	1	2	2		2	-				3	2	1
	CO5	2	1	3			1			2	3	1	3
	CO6	3	3	1	2	3	-		1	1	3	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCT105	Data Structure Using C	2.33	1.83	2.17	1.67	2.00	1.50	-	1.50	1.33	2.67	2.00	1.83

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

Syllabus for Application Programming in Python MCT173

School:		**Sharda School of Engineering & Technology**			
Department		**Computer Science & Applications**			
Programme:		**MSc(CS), Academic Year: 2023-24**			
Semester		**II**			
1	Course Code	MCT173			
2	Course Title	Application Programming in Python			
3	Credits	4			
4	Contact Hours (L-T-P)	4	0	0	
	Course Status	Regular			
5	Course Objective	The objective of the course is to equip students with the knowledge and skills needed to develop robust and efficient Python applications that solve practical problems with case study and minor project.			
6	Course Outcomes	Upon successful completion of this course, the student will be able to: CO1. Ability to design and implement python applications. CO2. Familiarity with Python libraries and frameworks. CO3. Understanding of Object-oriented programming (OOP) concepts. CO4. Ability to work with databases including case study. CO5. Understanding of web development concepts with minor project. CO6. Familiarity with best practices and coding standards.			
7	Course Description	Python is a language with a simple syntax, and a powerful set of libraries. It is widely used in many scientific areas for data exploration. This course is an introduction to the Python programming language for students without prior programming experience. This course will provide students with a solid foundation with case study and minor project in Python Programming and prepare them for more advanced courses or real-world projects.			
8	Outline syllabus				CO Mapping
	Unit 1	**Introduction**			
	A	**Introduction:** History, Python architecture, Variables, Data Types, Operators.			CO1, CO2
	B	**Python Syntax:** Comments, variables, conditional statements, loops.			CO1, CO2
	C	**Datatypes:** Numbers, strings, list, tuples, sets, dictionaries.			CO1, CO2
	Unit 2	**Libraries and Frameworks**			
	A	**Libraries:** Introduction and working with NumPy, Pandas, matplotlib, SciPy etc.			CO2, CO6
	B	**Frameworks:** Flask and Django			CO2
	C	**Exception Handling**: Definition Exception, Exception handling, except clause, Try? finally clause, User Defined Exceptions			CO2, CO6
	Unit 3	**Object oriented programming**			
	A	**OOPs concept**: Class and object, Attributes, Inheritance			C03
	B	Overloading, Overriding, Data hiding			CO3
	C	**Python File Operation:** Opening, Closing, Reading, Writing operation into files. Manipulating File Pointer			CO3, CO4
	Unit 4	**Database Handling**			
	A	**Python Database Interaction**: SQL Database connection using python, Creating and searching tables.			CO4
	B	Reading and storing config information on database.			C04

	C	Programming using database connections. Case study (5%)			CO4, CO6
	Unit 5	**Modules, Email Processing**			
	A	**Modules:** Importing module, Math module, Random module, Matplotlib, Packages.			CO5, CO6
	B	**Contacting User Through Emails Using Python:** Installing SMTP python module, Sending email.			CO5, CO6
	C	Reading from file and sending emails to all users addressing them directly for marketing. Minor Project (15%)			CO5, CO6
	Mode of examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. The Complete Reference Python, Martin C. Brown, McGrwHill			
	Other References	1. Introduction to computing in problem solving using Python, E Balagurusamy, McGrawHill 2. Introduction to programming using Python, Y. Daniel Liang, Pearson 3. Mastering Python, Rick Van Hatten, Packet Publishing House 4. Starting out with Python, Tony Gaddis, Pearson			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1. Ability to design and implement python applications.	PO1, PO3, PO5, PO6, PO10, PSO1, PSO2
2.	CO2. Familiarity with Python libraries and frameworks.	PO1, PO2, PO3, PO4, PO6, PSO1, PSO2
3.	CO3. Understanding of Object-oriented programming (OOP) concepts.	PO1, PO2, PO3, PO4, PO6, PSO1, PSO2
4.	CO4. Ability to work with databases.	PO1, PO2, PO3, PO4, PO5, PO6, PO10, PSO1
5.	CO5. Understanding of web development concepts.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO10, PSO1, PSO2
6.	CO6. Familiarity with best practices and coding standards.	PO1, PO2, PO3, PO4, PO 5, PO6, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name Application Programming in Python **Course Code (MCT173)**

Course Code_ Course Name	**CO's**	**PO 1**	**PO 2**	**PO 3**	**PO4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO2**
MCT173 Application Programming in Python	**CO1**	3	-	1	-	1	1	-		-	1	1	1
	CO2	2	3	2	1	-	1	-	-	-	-	1	2
	CO3	1	2	3	1	-	1	-	-	-	-	2	2
	CO4	1	1	2	3	2	2	-	-	-	1	1	-

	CO5	2	2	2	2	3	1	-	-	-	1	2	2
	CO6	2	3	3	2	2	2	-	-	-	1	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	**Course Name**	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**
MCT173	Application Programming in Python	**1.8**	**1.8**	**2.2**	**1.5**	**1.3**	**1.3**	**-**	**-**	**-**	**0.6**	**1.5**	**1.5**

Strength of Correlation
1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School: SSET		**Batch: 2023-25**	
Department		**Computer Science & Applications**	
Programme: MSc(CS)		**Current Academic Year: 2023-24**	
Branch:		**Semester: II**	
1	Course Code	MCT271	
2	Course Title	**Cloud Computing**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Elective	
5	Course Objective	1. Provide students with an overview of the fundamental concepts of Cloud Computing. 2. Gain insight into the challenges and limitations Models of cloud computing. 3. To learn the various technologies of the cloud computing paradigm and learn about recent advances in Cloud Computing and enabling technologies. 4. Prepare students for research in the area of cloud Computing risks and cloud security challenges. 5. Enhance student's communication and problem-solving skills	
6	Course Outcomes	At the end of the course, students will have achieved the following learning objectives. CO 1. Define the basics of cloud and recall the computer Science concepts which are helpful in understanding on demand service architecture. CO 2. Classify and describe the architecture and taxonomy of parallel and distributed computing, including shared and distributed memory, and data and task parallel computing. CO 3. Apply and Manage Virtualization and Workflow to use the cloud in file systems and applications. CO 4. Categorize and Characterize between Infrastructure services, deployment models, and governance in cloud computing. Examine the design of task and data parallel distributed algorithms for Clouds and use them to construct Cloud applications. CO 5. Evaluate the importance of cloud using monitoring and management of services for performance improvement of HPC and to follow the Governance and Compliances. CO 6. Elaborate the design concept and formulate to build the solution using cloud service providers as AWS, MS Azure and Google Cloud. Demonstrate the use of Map-Reduce, Vertex-Centric and Continuous Dataflow programming models.	
7	Course Description	This course introduces advanced aspects of Cloud Computing, encompassing the principles, to analyze the cloud, identify the problems, and choose the relevant models and algorithms to apply.	
8	Outline syllabus		CO Mapping
	Unit 1	**Cloud Computing Fundamentals**	
		A. Types of Computing, Grid computing, distributed computing, Client-server computing, Introduction to distributed systems, B. Cloud Computing definition, Roots of Cloud Computing, Cloud Architecture, Layers and Types of Clouds, Desired Features of a Cloud, Cloud Infrastructure Management, Major players in Cloud	CO1, CO2, CO3

		Computing, issues in Clouds, Understanding Services: SaaS, PaaS, IaaS C. Infrastructure as a Service Providers, Platform as a Service Providers, Database as a service, Communication as services, Challenges and Risks, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud,	
	Unit 2	**Understanding Abstraction and Virtualization**	
		A. Introduction to Virtual Machines, The Anatomy of Cloud Infrastructures, Pros and Cons of Virtualization, VM Provisioning and Manageability, Virtual Machine Migration Services, VMware, vSphere, Hyper-V. B. Management of Virtual Machines for Cloud Infrastructures, Understanding Machine Imaging, Distributed Management of Virtual Infrastructures, Scheduling Techniques C. The Logical Design, Secure Distributed Data Storage in Cloud Computing, Cloud Storage, Google file system, Technologies for Data Security in Cloud Storage	CO1, CO2, CO3
	Unit 3	**Cloud Computing Services and Applications**	
		A. Introduction of Comet Cloud, Aneka and Cloud Sim, Integration of Private and Public Clouds, Technologies and Tools for Cloud Computing, B. Introduction of Enterprises Demand and Cloud Computing, Dynamic ICT Services, Workflow Engine for Clouds, Workflow Management Systems, Architecture of Workflow Management Systems C. Scientific Application for Cloud Environments, Classification of Scientific Applications and Services in the Cloud, MapReduce Programming Model, MapReduce Impacts and Research Directions.	CO2, CO3, CO4
	Unit 4	**Cloud Computing Risk and Performance Issues**	
		A. Model for Federated Cloud Computing, Security Considerations, SLA Management in Cloud Computing: A Service Provider's Perspective, Types of SLA, Life Cycle of SLA, B. HPC in the Cloud: Performance-related Issues, Game Hosting on Cloud Resources, Building Content Delivery Networks Using Clouds, Resource Cloud Mashups C. Legal Issues in Cloud Computing (PCI DSS), Data Privacy and Security Issues, The CIA Triad: Confidentiality, Integrity, And Availability, Common Threats and Vulnerability in cloud, Cloud Service Provider (CSP) Risks	CO3, CO4, CO5
	Unit 5	**AWS, MS Azure and Google Cloud Services**	

		A. AWS Services: Elastic Compute Cloud, Identity and Access Management, Simple Storage Service, Content Delivery Network, CloudWatch B. MS Azure Services: Azure Virtual Machine, SQL Server on Virtual Machines, Azure SQL Database, Azure Active Directory C. Google Cloud: Compute Engine, Migrate for Compute Engine, Cloud Functions, Cloud Lab Balancing,			CO4, CO5, CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s* Other References	1. CLOUD COMPUTING Principles and Paradigms, Edited by Rajkumar Buyya, Jam 2. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter 3. Barrie Sosinsky "*Cloud Computing (Bible)"*,Wiley. 4. Ronald L. Krutz and Russell Dean Vines, "Cloud Security: A comprehensive Guide to Secure Cloud Computing", WILEY.			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1:Define the basics of cloud and recall the computer Science concepts which are helpful in understanding on demand service architecture.	PO1, PO2
2.	CO2:Classify and describe the architecture and taxonomy of parallel and distributed computing, including shared and distributed memory, and data and task parallel computing.	PO1, PO2, PSO1,
3.	CO3:Apply and Manage Virtualization and Workflow to use the cloud in file systems and applications.	PO1, PO2, PO3, PSO1, PSO2
4.	CO4:Categorize and Characterize between Infrastructure services, deployment models, and governance in cloud computing. Examine the design of task and data parallel distributed algorithms for Clouds and use them to construct Cloud applications.	PO1, PO2, PO4, PSO1, PSO2
5.	CO5:Evaluate the importance of cloud using monitoring and management of services for performance improvement of HPC and to follow the Governance and Compliances.	PO1,PO2,PO4,PSO1
6	CO6:Elaborate the design concept and formulate to build the solution using cloud service providers as AWS, MS Azure and Google Cloud. Demonstrate the use of Map-Reduce, Vertex-Centric and Continuous Dataflow programming models.	PO1,PO2,PO3,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Cloud Computing (Course Code MCT 271)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	3	3	--	--	--	--	--	--	--		--
CO2	3	2	2	--	--	--	--	--	--	--	1	
CO3	3	2	--	3	--		--	--	--	--	2	3
CO4	3	3	--	2	--		--	--	--	--	2	3
CO5	2	2	--	2	--		--	--	--	--	3	--
CO6	3	2	1		--		--	--	--	--	3	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	**Course Name**	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**
MCT271	Cloud Computing	2.5	2.3	1	1.16							1.83	1.3

Strength of Correlation
1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School		**Sharda School of Engineering & Technology**			
Department		**Computer Science & Applications**			
Batch:		**2023-25, Year 2023-24**			
Programme:		**MSc(CS)**			
Semester		**II**			
1	Course Code	MCT307			
2	Course Title	**Cryptography and Network Security**			
3	Credits	3			
4	Contact Hours (L-T-P)	3	0	0	
	Course Status	Elective			
5	Course Objective	To Have a good understanding of how applications can communicate securely and what tools and protocols exist in order to offer different levels of security			
6	Course Outcomes	• On successful completion of this module students will be able to • CO1: Illustrate network security services and mechanisms. • CO2: Evaluate Symmetrical and Asymmetrical cryptography. • CO3: Apply Data integrity, Authentication, Digital Signatures. • CO4: Analyze Various network security applications, IPsec, Firewall, IDS, Web security, Email security, and Malicious software etc. • CO5: Demonstrate various factors which affect the security of network CO6: Estimate the measure adapted towards network security			
7	Course Description	This course introduces aspects of cyber security, encompassing the principles, to analyze the data, identify the problems, and choose the relevant countermeasures to apply.			
8	Outline syllabus				CO Mapping
	Unit 1	**Security and Cryptography**			
	A	Introduction to Security, Security Attack, Security Services, Methods of Protection.			CO1, CO2
	B	Mathematics behind cryptography: Modular mathematics, GCD, Euclidean and Extended Euclidean algorithms, Prime numbers, Primality testing-Miller Rabin test.			CO5, CO6, CO3
	C	Classical cryptography: Substitution and Transposition Techniques. Mono a Poly-alphabetic Ciphers, Cryptanalysis.			CO6, CO4, CO2
	Unit 2	**Cryptographic Methods**			
	A	Properties of Trustworthy Encryption Systems, Types of Encryption Systems, Confusion and Diffusion, Data Encryption Standard (DES) Algorithm, Double and Triple DES.			CO1, CO2. CO3
	B	Advanced Encryption Standard (AES) Algorithm, DES and AES Comparison.			CO4, CO5, CO6
	C	Concept of Public Key Cryptography: RSA Technique, Key Exchange, Diffie-Hellman Scheme			CO1, CO6, CO3, CO4
	Unit 3	**Malicious program and Security**			
	A	Secure Programs, Non-malicious Program, Viruses and Other Malicious Code, Targeted Malicious Code, Methods of Control.			CO1, CO2, CO4
	B	Cryptographic Hash Functions, Digital Signature, Certificates, Certificate Authorities.			CO6, CO3, CO1

	C	Memory Protection, File Protection, Protection Methods of Operating Systems			CO3, CO4, CO6, CO5
	Unit 4	**Network security**			
	A	Network Concepts, Threats in Networks, Network Security Controls.			CO1, CO2, CO6
	B	Overview of IP Security (IPSec), IP Security Architecture, Modes of Operation, Security Associations (SA), Authentication Header (AH), Encapsulating Security Payload (ESP), Internet Key Exchange.			CO2, CO4, CO6
	C	Web Security Requirements, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Electronic Transaction (SET)			CO1, CO3, CO5
	Unit 5	**Electronic Mail Security**			
	A	Threats to E-Mail, Requirements and Solutions, Pretty Good Privacy (PGP), Secure E-Mail System			CO1, CO2, CO6
	B	Firewalls – Types, Comparison of Firewall Types, Firewall Configurations.			CO1. CO2, CO6, CO5
	C	Planning and Enforcing Security Policies: Planning Security Policies, Risk Analysis, Security Policies for an Organization, External Security.			CO2, CO3, CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. John E. Canavan, " The Fundamentals of Network Security," Artech House, February 2001, 350 pages. 2. Handbook of Information Security, Hossein Bidgol			
	Other References	NA			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Illustrate network security services and mechanisms.	PO1, PO2, PO4, PO10, PSO1
2.	CO2: Evaluate Symmetrical and Asymmetrical cryptography.	PO1, PO2, PO3, PO5, PO10, PSO1, PSO2
3.	CO3: Apply Data integrity, Authentication, Digital Signatures.	PO1, PO2, PO6, PO8 PO10, PSO1
4.	CO4: Analyze Various network security applications, IPsec, Firewall, IDS, Web security, Email security, and Malicious software etc.	PO1, PO2, PO7, PO8, PO10, PSO1, PSO2
5.	CO5: Demonstrate various factors which affect the security of network	PO1, PO2, PO3, PO9, PO10, PSO1, PSO2
6.	CO6: Estimate the measure adapted towards network security	PO1, PO2, PO9, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name Cryptography and Network Security (Course Code MCT307)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCT307 Cryptography and Network Security	CO1	3	3		3						3	2	
	CO2	3	2	3		3					3	2	3
	CO3	3	2				3		3		3	3	
	CO4	3	3					3	3		3	3	2
	CO5	2	3	3						3	2	3	3
	CO6	2	2							3	2	2	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCT307	Cryptography and Network Security	2.6	2.5	3	3	3	3	3	3	3	2.6	2.5	2.75

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School: SSET		**Batch :** 2023-2025	
Department		**Department of Computer Applications**	
Programme: MSc(CS)		**Academic Year:** 2023-2024	
Semester:		II	
1	Course Code	**ARP104**	
2	Course Title	**Quantitative and Qualitative Aptitude Skill Building**	
3	Credits	2	
4	Contact Hours (L-T-P)	1-0-2	
	Course Status	Active	
5	Course Objective	To enhance holistic development of students and improve their employability skills. Provide a 360 degree exposure to learning elements of Business English readiness program, behavioural traits, achieve softer communication levels and a positive self-branding along with augmenting numerical and altitudinal abilities. To up skill and upgrade students' across varied industry needs to enhance employability skills. By the end of this semester, a will have entered the threshold of his/her 2nd phase of employability enhancement and skill building activity exercise.	
6	Course Outcomes	After completion of this course, students will be able to: CO1: Develop and deliver the effective presentations to interpret the deeper meaning of life. CO2: Improve listening skills so as to understand complex business communication in a variety of global English accents through proper pronunciation CO3: Demonstrate a good understanding of effective business writing and telephone handling Skills CO4: Acquire higher level competency in use of aptitude, logical and analytical reasoning CO5: Develop higher level strategic thinking and diverse mathematical concepts through building number puzzles CO6: Demonstrate higher level quantitative aptitude tools for making business decisions	
7	Course Description	This course bundle allows students to build vision, mission and strategy statements while exposing them to various models of communication along with MTI reduction and the 2nd level of quant, aptitude and reasoning abilities.	
8		Outline syllabus – ARP104	CO MAPPING
	Unit 1	**Communicate to Conquer**	
	A	VMOSA (Vision, Mission, Values and Ethics)| Business Communication -Verbal Communication Skills | Barriers in communication | Basics of effective communication – PRIDE & STAR Model	CO1
	B	Different styles of communication & style flexing (Based on the 4 social styles-Analytical, Driving, Expressive, Amiable) | Importance of Listening & practice of Active Listening | The Art of Giving Feedbacks| Feedback Skills | Asking fact finding questions- Probing Skills	CO2
	C	Email Etiquette | Business Writing Skills| Telephone Etiquette Skills (Telephone Handling Skills) | Non Verbal Communication-Kinesthetics, Proxemics, Paralanguage | MTI Reduction Program |	CO3
	Unit 2	**Introduction to APTITUDE TRAINING- Reasoning- Logical/ Analytical**	

	A	Coding Decoding , Ranking & Their Comparison Level-2	CO4
	B	Series, Blood Relations & Number Puzzle	CO5
	Unit 3	**Quantitative Aptitude**	
	A	Number System Level 2	CO5
	B	Vedic Maths Level-2 | Probability | Permutation & Combination	CO6
	C	Percentage, Profit & Loss ,Partnership, Simple Interest & Compound Interest	CO6
	Unit 4	**Verbal Abilities – 2**	
	A	Paragraph Jumbles	CO2
	B	Critical Reasoning	CO2
	Unit 5	**Basics of GD and PI**	
	A	Understanding and Practicing Mock Group Discussions	CO2
	B	Understanding and Practicing Mock Personal Interviewsss	CO2
	Weightage Distribution	*CA MTE ETE* ***25% 25% 50%***	
	Text book/s*	*Wiley's Quantitative Aptitude-P Anand* | ***Quantum CAT – Arihant Publications*** | ***Quicker Maths- M. Tyra*** | *Power of Positive Action (English, Paperback, Napoleon Hill) | Streets of Attitude (English, Paperback, Cary Fagan, Elizabeth Wilson) The 6 Pillars of self-esteem and awareness – Nathaniel Brandon | Goal Setting (English, Paperback, Wilson Dobson*	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	1	2	-	-
CO2	-	-	-	-	-	-	-	-	1	2	-	-
CO3	-	-	-	-	-	-	-	-	1	2	-	-
CO4	-	-	-	-	-	-	-	-	1	2	-	-
CO5	1	-	-	-	-	-	-	-	1	2	-	-
CO6	1	-	-	-	-	-	-	-	1	2	-	-

School:		**Sharda School of Engineering & Technology**	
Department		**Computer Science & Applications**	
Batch		**2023-25**	
Academic Year		**2023-24**	
Programme:		**MSc(CS)**	
Semester:		**II**	
1	Course Code	MCP265	
2	Course Title	Data Structures using C LAB	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	1. Learn the basic concepts of Data Structures and algorithms. 2. Design and Implementation of Various Basic and Advanced Data Structures. 3. Learn the concepts of various searching, Sorting and Hashing Techniques. 4. Choose the appropriate data structures and algorithm design method for a specified application. 5. To learn the importance of designing an algorithm in an effective way by considering space and time complexity 6. To learn graph search algorithms.	
6	Course Outcomes	CO1: **Analyze** algorithms and their correctness. CO2 **Summarize** searching and sorting techniques CO3 **Describe** stack, queue and linked list operation. CO4: **Apply** important algorithmic design paradigms and methods of analysis CO5: **Develop** the capability to choose appropriate algorithm design techniques for solving problems. CO6: **Analyze** the performance of algorithms.	
7	Course Description	This course starts with an introduction to data structures with its classification, efficiency of different algorithms, array and pointer based implementations and Recursive applications. As the course progresses the study of Linear and Non-Linear data structures are studied in details. This Course also deals with the concept of searching and sorting methods. Specifically, it discusses recurrence relations, and illustrates their role in asymptotic and probabilistic analysis of algorithms. It covers in detail greedy strategies divide and conquer techniques, dynamic programming and illustrates them using a number of well-known problems and applications.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
		Implementation of factorial of a number using recursion Implementation of Fibonacci series using recursions	**CO1, CO2**
	Unit 2	**Array and Linked List**	
		Insert elements at a specific location in an array Insertion and deletion of elements in linked list	**CO2, CO3 CO6**
	Unit 3	**Stack and Queue**	
		Stack implementation using arrays Queue implementation using arrays Stack implementation using pointers Queue implementation using pointers	**CO1,CO2, CO3, CO6**
	Unit 4	**Tree and Graph**	
		Implement BFS, DFS	**CO1, CO4, CO6**
	Unit 5	**Searching and Sorting**	

		Linear search in a given list Binary search in a given list Implementation of binary search tree Implementation of bubble sort algorithm Implementation of insertion sort algorithm Implementation of quick sort algorithm Implementation of selection sort algorithm			**CO2, CO5**
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	CE (Viva)	ETE	
		25%	25%	50%	
	Text book/s*	1. Data Structure with C, Seymour Lipschutz, TMH 2. Data Structures using C. ReemaTharej , Oxford 2. Cormen et al., "Introduction of Computer Algorithms", Prentice Hall India 3. Data Structures, 2/e, Richard F, Gilberg ,Forouzan, Cengage 4. Data structures and algorithm analysis in C.			
	Other References	1. Data Structures and Algorithms, 2008, G. A. V. Pai, TMH 2. Classic Data Structures, 2/e, Debasis , Sarnanta,PHI,2009 3. Fundamentals of Data Structure in C, 2le,' Horowitz, Sahni, Anderson Freed, University Prees 4. Hopcroft A, The Design And Analysis Computer Algorithms, Addison Wesley			

PO and PSO mapping with level of strength for Data Structures using C Lab **(**MCP265**)**

Course Code_ Course Name	**COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
MCP265_ Data Structure Using C Lab	**CO1**	2	2	3	-	-	2		2	1	2	1	3
	CO2	3	3	2	1	1	-		2		3	2	2
	CO3	1		2	2	3	-				2		2
	CO4		2	3	3	2	-				2	3	
	CO5	2	1	3					2	2		1	2
	CO6	3	3		2	3	-		1	1	3	2	3

Average of non-zeros entry in following table (should be auto calculated)

Course Code	**Course Name**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**
MCP265	Data Structure Using C Lab	2.20	2.20	2.60	2.00	2.25	2.00	-	1.75	1.33	2.40	1.80	2.40

Strength of Correlation
1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School:		**Sharda School of Engineering & Technology**	
Department		**Computer Science & Applications**	
Batch		**2023-2025**	
Programme:		**MSc(CS)**	
Semester		**II**	
1	Course Code	MCP173	
2	Course Title	Application Programming in Python Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Regular	
5	Course Objective	Emphasis is placed on procedural programming, algorithm design, and language constructs common to most high level languages and Email handling through Python Programming.	
6	Course Outcomes	Upon successful completion of this course, the student will be able to: CO1. Apply decision and repetition structures in program design. CO2. Demonstrate the use of Python lists, tuples and dictionaries CO3. Describe and apply object-oriented programming methodology. CO4. Implement methods and functions to improve readability of programs. CO5. Model bottom-up approach in programming . CO6. Build Python programs to illustrate concise and efficient algorithms	
7	Course Description	Python is a language with a simple syntax, and a powerful set of libraries. It is widely used in many scientific areas for data exploration. This course is an introduction to the Python programming language for students without prior programming experience. We cover data types, control flow, object-oriented programming and Email handling	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based on conditional statements and control structures**	
		• Program to implement all conditional statements • Program to implement different control structures	CO1
	Unit 2	**Practical related to List, Tuples and Dictionaries**	
		• Program to implement operations on lists • Program to implement operations on Dictionary • Program to implement operations on Tuple	CO1,CO2
	Unit 3	**Practical related to Object Oriented Programming**	
		● Program to use object oriented concepts like inheritance, overloading polymorphism etc. ● Program for file handling	CO3
	Unit 4	**Practical related to Functions and Exception Handling**	
		● Program to implement Exception Handling ● Program to use different functions	CO4
	Unit 5	**Practical related to Database**	
		● Program to make connections with different databases	CO5,CO6

		• Program to access database			
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	CE (Viva)	ETE	
		25%	25%	50%	
	Text book/s*	• The Complete Reference Python, Martin C. Brown, McGrwHill			
	Other References	• Introduction to computing in problem solving using Python, E Balahurusamy, McGrwHill • Introduction to programming using Python, Y. Daniel Liang, Pearson • Mastering Python, Rick Van Hatten, Packet Publishing House • Starting out with Python, Tony Gaddis, Pearson			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) &Programme Specific Outcomes (PSO)
1.	CO1. Apply decision and repetition structures in program design.	PO1 PO2,PO3,PO4, PO5,PO10,PSO1,PSO2
2.	CO2. Demonstrate the use of Python lists, tuples and dictionaries	PO1,PO2, PO3,PO4, PO5, PO10,PSO1,PSO2
3.	CO3. Describe and apply object-oriented programming methodology.	PO1, PO2,PO3,PO4, PO5,PO10,PSO1,PSO2
4.	CO4. Implement methods and functions to improve readability of programs.	PO1,PO2,PO3,PO4,PO5,PO10, PSO1
5.	CO5. Model bottom-up approach in programming in database.	PO1,PO2,PO3,PO4,PO5,PO10,PSO1,PSO2
6.	CO6. Built Python programs to illustrate concise and efficient algorithms	PO1, PO2,PO3,PO4,PO5,PO10, PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Application Programming in Python Lab **(Course Code** MCP173**)**

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCP173 Application Programming in Python Lab	**CO1**	2	1	1	1	1	-	2	-	-	1	2	2
	CO2	1	1	1	1	1	-	2	-	-	1	1	1
	CO3	2	2	2	1	1	-	2	-	-	1	1	2
	CO4	2	2	2	2	1	-	2	-	-	1	1	-
	CO5	2	2	3	2	1	-	2	-	-	1	2	2
	CO6	3	3	3	2	2	-	2	-	-	1	3	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCP173	Application Programming in Python Lab	**2**	**1.8**	**2**	**1.5**	**1.1**		**2**			**1**	**1.6**	**1.6**

Strength of Correlation
1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

PO and PSO mapping with level of strength for Course Name Application Programming in Python Lab **(Course Code** MCP173**)**

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCP173 Application Programming in Python Lab	**CO1**	2	1	1	1	1	-	2	-	-	1	2	2
	CO2	1	1	1	1	1	-	2	-	-	1	1	1
	CO3	2	2	2	1	1	-	2	-	-	1	1	2
	CO4	2	2	2	2	1	-	2	-	-	1	1	-
	CO5	2	2	3	2	1	-	2	-	-	1	2	2
	CO6	3	3	3	2	2	-	2	-	-	1	3	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCP173	Application Programming in Python Lab	**2**	**1.8**	**2**	**1.5**	**1.1**		**2**			**1**	**1.6**	**1.6**

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

TERM-III

School		**Sharda School of Engineering & Technology**	
Department		**Computer Science & Applications**	
Batch		**2023-2025, Academic Year 2024-25**	
Program		**MSc(CS)**	
Semester		**III**	
1	Course Code	MCT203	
2	Course Title	Design and Analysis of Algorithms	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status	Core	
5	Course Objective	Objective of this course is to 1. Reinforce basic design concepts (e.g., pseudocode, specifications, top-down design) 2. Knowledge of algorithm design strategies 3. Familiarity with an assortment of important algorithms. 4. Enable students to analyze time and space complexity.	
6	Course Outcomes	Students will be able to: **CO1: Analyze** the asymptotic performance of algorithms **CO2**: **How** to write rigorous correctness proofs for algorithms. **CO3: Demonstrate** familiarity with major algorithms and data structures **CO4: Apply** important algorithmic design paradigms and methods of analysis **CO5: Develop** the capability to choose appropriate algorithm design techniques for solving problems. **CO6: Analyze** the performance of algorithms.	
7	Course Description	This course introduces concepts related to the design and analysis of algorithms. Specifically, it discusses recurrence relations, and illustrates their role in asymptotic and probabilistic analysis of algorithms. It covers in detail greedy strategies divide and conquer techniques, dynamic programming and max flow - min cut theory for designing algorithms, and illustrates them using a number of well-known problems and applications.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework	CO2, CO3
	B	Asymptotic Notations and their properties – Mathematical analysis for Recursive and Non-recursive algorithms, Recurrences relations	CO1, CO2, CO3,CO6
	C	Divide-and-conquer: Analysis and Structure of divide-and-conquer algorithms, Divide-and-conquer examples- Binary search, Quick sort, Merge sort, Medians and Order Statics	CO1, CO2, CO4, CO5
	Unit 2	**Greedy Method**	
	A	Overview of the Greedy paradigm, Analysis and example of exact optimization solution, Minimum Spanning Tree – Prim's and Kruskal's Algorithm	CO1, CO2, CO3, CO4, CO5
	B	Fractional Knapsack problem, Single source shortest paths, task scheduling	CO1, CO2, CO4,CO5
	C	Overview and analysis of Backtracking & Branch and Bound: N-Queens problem and Sum of subsets	CO1, CO2, CO3, CO4

	Unit 3	**Dynamic Programming**			
	A	Overview, Difference between dynamic programming and divide and conquer			CO1, CO2, CO4
	B	Applications and analysis: Matrix Chain Multiplication, 0/1 Knapsack Problem records			CO1, CO2 ,CO3, CO4
	C	Applications and analysis: Longest Common sub-sequence, All pairs shortest paths			CO1, CO2, CO3, CO4, CO5
	Unit 4	**Advanced Data Structures**			
	A	Red-Black Trees - Definition, Applications, Insertion and deletion of elements in RB-Tree			CO1, CO2 ,CO3, CO5
	B	B-Trees - Definitions, Applications, Insertion and Deletion in B-Trees			CO1, CO2, CO3 ,CO6
	C	Data Structure for Disjoint Sets - Definition, Operations, Applications in Kruskal's algorithm.			CO1, CO2, CO3
	Unit 5	**Selected Topics**			
	A	Introduction to NP Complete and NP-Hard Problems, Examples, Amortized Analysis			CO1, CO2, CO3,
	B	Approximation Algorithms – Travelling Sales Person Problem and Vertex Cover Problem, Randomized Algorithms.			CO3, CO4, CO5,
	C	String Matching Algorithms – Naive String Matching Algorithm, Rabin Karp Algorithm.			CO2, CO5, CO6
	Mode of Examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Cormen et al., "Introduction of Computer Algorithms", Prentice Hall India.			
	Other References	1. Hopcroft A, The Design And Analysis Computer Algorithms, Addison Wesley			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	**CO1:** Analyze the asymptotic performance of algorithms	PO1,PO2,PO3,PO5,PO10,PSO1,PSO2
2.	**CO2**: Write rigorous correctness proofs for algorithms	PO1, PO3, PO4, PSO2
3.	**CO3:** Demonstrate a familiarity with major algorithms and data structures	PO1,PO2,PO3,PO6,PO9,PSO1
4.	**CO4:** Apply important algorithmic design paradigms and methods of analysis	PO1,PO2,PO3,PO4,PO5,PO9,PO10,PSO1,PSO2
5.	**CO5:** Ability to choose appropriate algorithm design techniques for solving problems.	PO1,PO2,PO3,PO4,PO5,PO6,PO10,PSO1,PSO2
6.	**CO6:** Ability to analyze the performance of algorithms.	PO1,PO2,PO3,PO5,PO9,PO10,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Design and Analysis of Algorithms

Course Code_ Course Name	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCT203 Design and Analysis of Algorithm	CO1	3	3	2	-	3	-	-	-	-	3	3	2
	CO2	2	3	3	-	2	2	-	-	3	2	2	1
	CO3	3	2	2	-	-	1	-	-	2	-	2	-
	CO4	2	3	3	2	3	-	-	-	1	2	3	2
	CO5	3	2	2	2	3	2	-	-	-	1	3	2
	CO6	2	3	3	-	1	-	-	-	1	2	2	-

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCT203	Design and Analysis of Algorithm	2.5	2.67	2.5	2	2.4	1.25			1.75	2	2.5	1.75

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School		**Sharda School of Engineering & Technology**	
Department		**Computer Science & Applications**	
Branch		**2023-25**	
Program		**MSc(CS): Current Academic Year: 2024-25**	
Semester:		**III**	
1	Course Code	MCT168	
2	Course Title	Object Oriented Programming with Java	
3	Credits	4	
4	Contact Hours (L-T-P)	4-0-0	
	Course Status	Core	
5	Course Objective	To learn Java language syntax and semantics and concepts such as classes, objects, inheritance, AWT Applets, polymorphism, packages and multithreading Java Servlets.	
6	Course Outcomes	CO1. Define Object oriented programming concepts by identifying classes, objects, members of a class and relationships among them needed for a specific problem. CO2: Illustrate different features of java. CO3: Develop Java programs to solve problems of applications using OOP principles such as abstraction, polymorphism and inheritance. CO4:Categorize runtime errors thrown in the application software or generated runtime by applying the methods of exception handling and File I/O and Applets CO5. Explain the concept of multithreading and Java Servlet. CO6. Design real life application using Java.	
7	Course Description	Basic *Object Oriented Programming* (*OOP*) concepts including objects, *classes*, methods, parameter passing, information hiding, inheritance and polymorphism , graphical view and network programming are discussed.	
8	Outline syllabus		CO Mapping
	Unit 1	**Object Oriented Programming Concepts**	
	A	Introduction to OOP, Characteristics of OOP, Difference between OOP and procedural languages, Features of Java	CO1, CO2
	B	Platform independency of Java, Architecture of JDK, JRE and JVM. memory allocation and garbage collection to Java Programs.	CO1, CO2
	C	Introduction to IDE for java development, Writing first program in Java and program execution steps. Features of Java	CO1, CO2
	Unit 2	**Introduction to Java**	
	A	Java Programming Fundamentals: declaring variables and Constants, Java data Types and size of each type, arithmetic, logical and bitwise Operators in java,	CO1,CO2

	B	Control statements : if ..else, switch.. case, Loop control : for loop, while loop, do.. while loop, break and continue, nesting of decision and loop control.			CO1, CO2
	C	Passing arguments from commandline, Arrays in Java, Type conversion, promotion rules in expressions.			CO1, CO2
	Unit 3	**Class , object and constructor**			
	A	Defining Classes , class members, declaration of Objects, taking Input from users			CO1,CO2
	B	Methods, Method overloading, Constructors, Constructors overloading			CO1,CO2,CO3
	C	static keyword, Static methods, Static members. Reason of making main function static, Strings, string handling			CO2
	Unit 4	**Inheritance, package and Interface Inheritance Implementation**			
	A	Inheritance Implementation: Types of Inheritance, Multilevel Hierarchy, Overriding methods, Polymorphism, use of this and super, Constructor call in inheritance			CO2,CO3,CO6
	B	Abstract class and method, Final class, method and variable, Implementing Interface, Concept of multiple inheritance in Java, Wrapper class,			CO2,CO3,CO6
	C	Packages: User defined packages, built-in packages (java.langpackage), Access modifiers AWT and Applets (10%)			CO2,CO3,CO6
	Unit 5	**I/O, Exception and Multithreading**			
	A	Input/output: Exploring java.io, File, Stream Classes Byte Stream Classes and Character stream Classes, Reading and writing in file			CO4,CO6
	B	Introduction to Exception Handling, Introduction to try, catch, Finally , throw and throws, Checked and Unchecked exceptions, User define exception			CO4,CO6
	C	Introduction to Multithreading: multithreading advantages and issues, Creating thread using Runnable interface and Thread class, Thread life cycle, Thread priorities, sleep method. Java Servlet and network programming (10%)			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1.Schildt H, “The Complete Reference JAVA2”, TMH			
	Other References	1. Balagurusamy E, “Programming in JAVA”, TMH 2. Professional Java Programming: BrettSpell, WROX Publication			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1. Define Object oriented programming concepts by identifying classes, objects, members of a class and relationships among them needed for a specific problem.	PO1, PO2, PO3, PO5, PO10, PSO1, PSO2
2.	CO2: Illustrate different features of java.	PO1, PO2, PO4, PO10, PSO1, PSO2
3.	CO3: Develop Java programs to solve problems of applications using OOP principles such as abstraction, polymorphism and inheritance.	PO1, PO2, PO3, PO5, PO9, PO10, PSO1, PSO2
4.	CO4:Categorize runtime errors thrown in the application software or generated runtime by applying the methods of exception handling and File I/O	PO1, PO2, PO3, PO5, PO10, PSO1, PSO2
5.	CO5. Explain the concept of multithreading.	PO1, PO2, PO5, PO10, PSO1, PSO2
6.	CO6. Design real life application using Java.	PO1, PO2, PO3, PO5, PO9, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name Object oriented programming with JAVA (Course Code MCT168)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	2	2		2					2	1	2
CO2	2	2								2	1	1
CO3	2	3	3		3				3	2	3	3
CO4	2				3					2	2	3
CO5	1	2			1					2	2	1
CO6	3	3	3		3				3	2	3	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCT168	**Object Oriented Programming with Java**	**2**	**2**	**2**		**2.5**				**3**	**2**	**2**	**2**

School		**Sharda School of Engineering & Technology**	
Department		**Computer Science & Applications**	
Batch		**2023-25, Academic Year 2023-24**	
Program		**MSc(CS)**	
Semester		**III**	
1	Course Code	MCT357	
2	Course Title	Computer Architecture and Organization	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status	Core	
5	Course Objective	Objective of this course is to 1. To learn the design of Control Unit and ALU of a typical computer 2. To learn about the memory, input –output organization of a typical computer 3. To learn the concepts of pipelining and vector processing.	
6	Course Outcomes	Students will be able to: **CO1:** Understand the basic structure and operation of a digital computer system. **CO2**: Analysis of the design of ALU and understanding fixed-point and floating-point arithmetic operations. **CO3:** Know the concepts of control unit techniques and the concept of Pipelining. **CO4:** Understand the hierarchical memory system and its mechanisms. **CO5:** Understand cache memories and virtual memory concepts. **CO6:** Analyze I/O devices and standard I/O interfaces performance of interrupt in CPU.	
7	Course Description	Computer Architecture and Organization is a foundational course that explores the design and structure of computer systems. Students will learn about the fundamental principles and components that enable the execution of programs and the functioning of modern computers. This course covers topics such as instruction set architecture, memory systems, processor organization, input/output systems, and system performance evaluation	
8	Outline Syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Functional units of digital system and their interconnections	CO2, CO3
	B	Buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer.	CO1, CO2, CO3,CO6
	C	Processor organization, general registers organization, stack organization and addressing modes.	CO1, CO2, CO4, CO5
	Unit 2	**Arithmetic and Logic Unit**	
	A	Look ahead carries adders. Multiplication: Signed operand multiplication, Booths algorithm and array multiplier	CO1, CO2, CO3, CO4, CO5
	B	Division and logic operations. Floating point arithmetic operation, Arithmetic & logic unit design.	CO1, CO2, CO4,CO5
	C	IEEE Standard for Floating Point Numbers	CO1, CO2, CO3, CO4
	Unit 3	**Control System Unit**	

	A	Instruction types, formats, instruction cycles and sub cycles (fetch and execute etc), micro operations, execution of a complete instruction.			CO1, CO2, CO4
	B	Program Control, Reduced Instruction Set Computer, Pipelining.			CO1, CO2 ,CO3, CO4
	C	Hardwire and micro programmed control: micro programme sequencing, concept of horizontal and vertical microprogramming.			CO1, CO2, CO3, CO4, CO5
	Unit 4	**System Memory**			
	A	Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories.			CO1, CO2 ,CO3, CO5
	B	Cache memories: concept and design issues & performance, address mapping and replacement Auxiliary memories.			CO1, CO2, CO3 ,CO6
	C	Magnetic disk, magnetic tape and optical disks Virtual memory: concept implementation.			CO1, CO2, CO3
	Unit 5	**Input / Output Devices**			
	A	Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions.			CO1, CO2, CO3,
	B	Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors.			CO3, CO4, CO5,
	C	Serial Communication: Synchronous & asynchronous communication, standard communication interfaces.			CO2, CO5, CO6
	Mode of examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Computer System Architecture - M. Mano. 2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky Computer Organization, McGraw-Hill, Fifth Edition, Reprint 2012			
	Other References	1. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition, 1998. 2. William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson Education, Seventh edition, 2006. 2. David A. Patterson and John L. Hennessy, "Computer Architecture-A Quantitative Approach", Elsevier, a division of reed India Private Limited, Fifth edition, 2012			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	**CO1**: Understand the basic structure and operation of a digital computer system.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:** Analysis of the design of ALU and understanding fixed-point and floating point arithmetic operations.	PO2,PO3, PO4, PSO2
3.	**CO3:** Know the concepts of control unit techniques and the concept of Pipelining.	PO2,PO3,PO5,PSO2
4.	**CO4:** Understand the hierarchical memory system and its mechanisms.	PO6, PO10, PSO2
5	**CO5:** Understand cache memories and virtual memory concepts.	PO4,PO7,PO8, PO10, PSO1
6.	**CO6:** Analyze I/O devices and standard I/O interfaces performance of interrupt in CPU.	PO2,PO8, PO1

PO and PSO mapping with level of strength for: Computer Organization and Architecture (Course Code:MCT357)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	2	2	2	-	-	-	-	-	-	3	-
CO2	-	2	3	2	-	-	-	-	-	-	-	2
CO3	-	2	3	-	3	-	-	-	-	-	-	2
CO4	-	-	-	-	-	3	-	-	-	2	-	2
CO5	-	-	-	3	-	-	3	2	-	2	-	3
CO6	-	2	-	-	-	-	-	3	-	-	1	-

Average of non-zeros entry in following table (should be auto calculated).

Course Code	**Course Name**	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**
MCT357	Computer Architecture and Organization	3	2	2.66	2.33	3	3	3	2.5	-	2	2	2.25

School:		**Sharda School of Engineering & Technology**
Department:		**Computer Science & Applications**
Batch:		**2023-25**
Programme: MSc(CS)		**Current Academic Year: 2024-25**
Semester:		**III**
1	Course Code	MCT366
2	Course Title	Big Data Analytics
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Elective
5	Course Objective	Understand the Big Data Platform and its Use cases • Provide an overview of Apache Hadoop • Provide HDFS Concepts and Interfacing with HDFS • Understand Map Reduce Jobs • Provide hands on Hadoop Eco System • Apply analytics on Structured, Unstructured Data. • Exposure to Data Analytics with
6	Course Outcomes	The students will be able to: **CO1:** Identify Big Data and its Business Implications. **CO2**: List the components of Hadoop and Hadoop Eco-System **CO3**: Access and Process Data on Distributed File System **CO4**: Manage Job Execution in Hadoop Environment **CO5**: Develop Big Data Solutions using Hadoop Eco System **CO6**: Develop big data handling applications for end user
7	Course Description	This course provides a comprehensive introduction to big data analytics, equipping students with the skills to extract valuable insights from large and complex datasets. Students will learn techniques for data acquisition, storage, processing, and analysis, using cutting-edge tools and technologies such as Hadoop, Spark, and NoSQL databases.
8	Outline syllabus	CO Mapping

	Unit 1	**INTRODUCTION TO BIG DATA AND HADOOP**			
	A	Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop			CO1, CO2
	B	Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming,			CO1, CO2
	C	Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.			CO1, CO2
	Unit 2	**HDFS(Hadoop Distributed File System)**			
	A	The Design of HDFS, HDFS Concepts, Command Line Interface			CO1, CO2,CO4
	B	Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives,			CO1, CO2,CO4
	C	Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures..			CO1, CO2,CO4
	Unit 3	**Map Reduce**			
	A	Anatomy of a Map Reduce Job Run, Failures, Job Scheduling			CO1,CO2,CO3
	B	Shuffle and Sort, Task Execution,			CO1,CO2,CO3
	C	Map Reduce Types and Formats, Map Reduce Features.			CO4
	Unit 4	**Hadoop Eco System**			
	A	**Pig**: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.			CO1,CO2,CO3
	B	**Hive**: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.			CO1,CO2,CO3
	C	**Hbase :** HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction			CO1,CO2,CO3
	Unit 5	**Data Analytics with R:**			
	A	Introduction, Supervised Learning, Unsupervised Learning,			CO1,CO2,CO3
	B	Collaborative Filtering			CO1,CO2,CO3
	C	Big Data Analytics with BigR.			CO1,CO2,CO3
	Mode of examination	Theory			
		CA	MTE	ETE	

	Weightage Distribution	25%	25%	50%	
	Text book/s*	1. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012. 2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015			
	Other References	1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007. 2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013) 3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	**CO1** Identify Big Data and its Business Implications.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:** List the components of Hadoop and Hadoop Eco-System	PO1, PO3, PO4, PSO2
3.	**CO3:** Access and Process Data on Distributed File System	PO2
4.	**CO4:** Manage Job Execution in Hadoop Environment	PO7, PO10,
5	**CO5:** Develop Big Data Solutions using Hadoop Eco System	PO4,PO8
6.	**CO6:** Develop big data handling applications for end user	PO4,PO8

PO and PSO mapping with level of strength for Course Name Big Data Analytics (Course Code MCT 366)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	3	3	--	--	--	2	2	1	3	2
CO2	3	2	3	3	--	--	--	2	2	2	2	3
CO3	3	3	3	3	--	--	--	1	1	1	3	2
CO4	2	2	2	2	1	--	--	2	3	3	2	2
CO5	3	2	3	3	1	-	1	3	2	2	2	2
CO6	3	2	3	3	1	-	1	3	2	2	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCT366	Big Data Analytics	2.83	2.33	2.83	2.83	1		1	2.16	2	1.83	2.33	2.16

School: SSET		**Batch: 2023-25**	
Department		**Computer Science & Applications**	
Programme: MSc(CS)		**Current Academic Year: 2024-25**	
Semester:		III	
1	Course Code	MCT116	
2	Course Title	Artificial Intelligence	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Core	
5	Course Objective	The objective of the course is to introduce basic fundamental concepts in Artificial Intelligence (AI), with a practical approach in understanding them. To visualize the scope of AI and its role in futuristic development.	
6	Course Outcomes	Students will be able to: **CO1:** Compare AI and non-AI solutions. **CO2:** Apply AI techniques in problem solving. **CO3:** Analyze the best search technique and implement it in real-life applications. **CO4:** Classify supervised and unsupervised learning and knowledge representation. **CO5:** To explore the scope of AI in various application domains. **CO6:** Discuss the applicability of Artificial Intelligence and Machine learning Approaches to develop sustainable solutions using professional ethics.	
7	Course Description	This course introduces basic aspects of Artificial intelligence comparing the AI and conventional solutions to real world problems, utilizing and analyze AI techniques for identifying optimal solutions to search strategies.	
8	Outline syllabus		CO Mapping
	Unit 1	**INTRODUCTION TO AI**	
	A	Foundation of AI, Goals of AI, History and AI course line,	CO1, CO5
	B	Introduction to Intelligent Agents; Environment; Structure of Agent,	CO1, CO5
	C	AI Solutions Vs Conventional Solutions; a philosophical approach; a practical approach.	CO1, CO5
	Unit 2	**PROBLEM SOLVING AGENTS**	
	A	Problem solving using Search Techniques; Problems; Solutions; Optimality,	CO1, CO2, CO3
	B	Informed Search Strategies; Greedy Best-First; A* Search; Heuristic Functions,	CO1, CO2, CO3
	C	Uninformed Search Strategies; BFS; DFS; DLS; UCS; IDFS; BDS. Local Search algorithms: Hill Climbing, genetic Algorithms.	CO1, CO2, CO3
	Unit 3	**KNOWLEDGE & REASONING**	
	A	Knowledge-Based Agents; clause form, First-Order Logic; Syntax-Semantics in FOL;	CO1,CO4
	B	Representation revisited, ; Simple usage; Inference Procedure; Inference in FOL;	CO1, CO4
	C	Forward Chaining; Backward Chaining; Resolution	CO4
	Unit 4	**LEARNING**	
	A	Common Sense Vs Learning; Components; Representations; Forms of learning, Feedback, Learning Types: Supervised; Unsupervised;	CO4
	B	Reinforcement Learnings, Decision trees,	CO4
	C	Artificial Neural Networks: Introduction, types of networks; Single Layer and Multi-Layer n/w.	CO4
	Unit 5	**APPLICATIONS**	

	A	Case studies on NLP, Image Processing			CO1,CO5
	B	Robotics – Hardware; Vision, Navigation based case studies,			CO1,CO5
	C	Water jug problem and similar case studies			CO1,CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Russell S & Norvig P, Artificial Intelligence: A Modern Approach, Prentice Hall.			
	Other References	1. Rich E& Knight K, Artificial Intelligence, Tata McGraw Hill, Edition 3. 2. Dan W. Patterson, Artificial Intelligence & Expert Systems, Pearson Education with Prentice Hall India. Indian Edition.			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	**CO1:** Compare between AI and non-AI solutions.	PO1,PO2,PO7,PO9,PO10, ,PSO1
2.	**CO2:** Apply AI techniques in problem solving.	PO2, PO3, PO4, PO5, PSO2
3.	**CO3:** Analyze the best search technique and implement it in real-life applications.	PO1,PO2,PO3,PO4, PO6, PO9, PO10
4.	**CO4:** Classify supervised and unsupervised learning and knowledge representation.	PO6, PO10
5.	CO5: To explore the scope of AI in various application domains.	PO9, PO10
6.	**CO6:** Discuss the applicability of Artificial Intelligence and Machine learning Approaches to develop sustainable solutions using professional ethics.	PO2,PO3,PO4, PO6, PO9

PO and PSO mapping with level of strength for Course Name Artificial Intelligence

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
Artificial Intelligence (MCT116**)**	**CO1**	**3**	**3**	**3**	**1**	**2**	**1**	**1**	**1**	**2**	**3**	**2**	**3**
	CO2	**3**	**3**	**3**	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**2**	**3**
	CO3	**3**	**3**	**3**	**1**	**2**	**3**	**3**	**1**	**3**	**3**	**3**	**3**
	CO4	**3**	**3**	**3**	**1**	**2**	**3**	**3**	**1**	**3**	**3**	**3**	**3**
	CO5	**3**	**3**	**3**	**1**	**2**	**3**	**3**	**1**	**3**	**3**	**3**	**3**
	CO6	**3**	**3**	**3**	**1**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCT116	**Artificial Intelligence**	**3.00**	**3.00**	**3.00**	**1.00**	**2.00**	**2.67**	**2.67**	**1.33**	**2.67**	**3.00**	**2.67**	**3.00**

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***

3. Addressed to ***Substantial (High=3) extent***

School:		**Sharda School of Engineering & Technology**	
Department		**Computer Science & Applications**	
Batch		2023-25	
Programme:		**MSc(CS)**	
Semester		III	
1	Course Code	MCL011	
2	Course Title	Android Application Development Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Core /Elective/Open Elective	
5	Course Objective	Android application development course is designed to help students to implement application for android devices. The student will learn the basics of android platform and understand application Lifecycle.	
6	Course Outcomes	**CO1:** Demonstrate and understanding anatomy of an android application. **CO2:** Develop various android applications related to layouts and rich uses interactive interfaces. **CO3:** Apply essential android programming concept. **CO4:** Distinguish and compare different components of Android. **CO5:** Access and work with databases under an android operating system. **CO6:** Develop Basic and advance android app development for android devices.	
7	Course Description	This android development course will help students to understand the basis of Android platform and its lifecycle. This will help them to implement simple GUI applications, use built-in components and work with database to store the data.	
8	Outline Syllabus		CO Mapping
	Unit 1	**Introduction of Android**	
	A	History of Android, Features of Android, Android Devices, Open Handset Alliance (OHA), Advantages of Android, Comparing Android with other platform	CO1
	B	Android Directory Structure, Android Development Tools, Architecture of Android.	CO1
	C	Structure of Manifest files, Activities, Activity life cycle	CO1
	Unit 2	**Android User Interfaces**	
	A	Layouts-Linear layout, Relative layout, Constraint layout	CO1,CO2
	B	Input Controls – Text input, Checkboxes, Radio buttons, Spinner, Toggle buttons and switches	CO1,CO2
	C	Event delegation model, Type of Event Listeners, Onclick, OnLongClick, OnFocusChanged, OnKeyUp, OnKeyDown	CO1,CO2
	Unit 3	**Components of Android**	
	A	Intents, types of intents, Intent Filter, Sending and Receiving of data.	CO3
	B	Services, service life cycle, Broadcast receivers.	CO3
	C	Notifications , Type of notification, Toast notification	CO3
	Unit 4	**Working with SQL Lite**	
	A	Introduction to SQLite database, Steps for connecting application with database.	CO4,CO5
	B	Fetch and update data in database from application,	CO4,CO5
	C	Cursor and content value, opening and closing database.	CO4,CO5
	Unit 5	**Sensors and Animation**	
	A	Sensor Manager, Sensor Framework, Detect availability of sensor, Fetch data from sensors on frequent basis.	CO6
	B	Types of Sensors Accelerometer, Gyroscope, Proximity Sensor, Orientation, Light Sensor.	CO6

	C	Graphics and Animation.			CO6
	Mode of examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	CE (Viva)	ETE	
		25%	25%	50%	
	Text book/s*	1. W.M Lee, "Beginning Android 4 Application Development", Wiley. 2. Retro Meier," Android 4 Application Development", Wiley.			
	Other References	1. Lauren Darcy, Shane Conder, Sams Teach Yourself Android Application Development in 24 Hrs, 1st ed. 2. Jeff Mcwherter, Scott Gowell, Professional Mobile Application Development, Wrox Publisher(2012), 1st ed.			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Demonstrate and understanding anatomy of an android application.	PO1,PO4,PO5,PO10
2.	CO2: Develop various android applications related to layouts and rich uses interactive interfaces.	PO2,PO3,PO4,PO5,PO9,PO10,PSO1,PSO2
3.	CO3:Apply essential android programming concept	PO1,PO4,PO5,PO10,PSO1
4.	CO4: Distinguish and compare different components of Android	PO4,PO5,PO10
5.	CO5: Access and work with databases under an android operating system.	PO1,PO2,PO4,PO5,PO7,PO9,PO10,PSO1
6.	CO6: Develop Basic and advance android app development for android devices	PO1,PO2,PO3,PO4,PO5,PO7,PO8,PO9,PO10,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Android Application Development **Lab (Course Code** MCL011**)**

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCL011_ Android Application Development	**CO1**	1			2	2					2		
	CO2		2	2	2	2				2	2	1	1
	CO3	1			2	2					2	1	
	CO4				2	2					2		
	CO5	1	1		2	2		1		2	2	1	
	CO6	1	2	3	2	2		1	1	2	2	2	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCL011	Android Application Development Lab	1	1.67	2.5	2	2	0	1	1	2	2	1.25	1.5

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School: SSET		**Batch :** 2023-2025
Programme: MSc(CS)		**Computer Science & Applications**
Semester		**III**
1	Course Code	**ARP 307**
2	Course Title	**Personality Development Decision making and Negotiation Skills**
3	Credits	2
4	Contact Hours (L-T-P)	1-0-2
	Course Status	Active
5	Course Objective	To enhance holistic development of students and improve their employability skills. Provide a 360 degree exposure to learning elements of Business English readiness program, behavioural traits, achieve softer communication levels and a positive self-branding along with augmenting numerical and altitudinal abilities. To up skill and upgrade students' across varied industry needs to enhance employability skills. By the end of this semester, a will have entered the threshold of his/her 3rd phase of employability enhancement and skill building activity exercise.
6	Course Outcomes	After completion of this course, students will be able to: CO1: Apply skills of personality development which will help a student groom to meet the needed social strata for establishing themselves in the society CO2: Build a positive behavioural attitude and attributes developing interpersonal skills for building positive and meaningful social and professional relationships CO3: Review and revise development plans to adapt to changing aspirations, circumstances and working environments CO4: Acquire higher level competency in use of numbers and digits, logical and analytical reasoning CO5: Develop higher level strategic thinking and diverse mathematical concepts through building cubes and cuboids. CO6: Demonstrate higher level quantitative aptitude such as analytical and statistical tools for making business decisions.
7	Course Description	This bundles Training approach attempts to explore the personality, character, and the natural style of the student. This helps to develop character, personality, confidence and interpersonal abilities within the student along with level 3 readiness in quant, aptitude and reasoning skills

8	syllabus – ARP305		
	Unit 1	**Impress to Impact**	**CO MAPPING**
	A	What is Personality?| Creating a positive impression – The 3 V's of Impression | Individual Differences and Personalities	CO1
	B	Personality Development and Transformation | Building Self Confidence | Behavioural and Interpersonal Skills	CO2
	C	Avoiding Arguments | The Art of Assertiveness | Constructive Criticism | The Personal Effectiveness Grid | Assessing our Strengths & Limitations and Creating an Action Plan for Learning with the 4M Model	CO3
	Unit 2	**Introduction to APTITUDE TRAINING- Reasoning- Logical/ Analytical**	
	A	Numbers & Digits , Mathematical Operations | Analytical Reasoning	CO4

	B	Cubes & Cuboids | Statement & Assumptions	CO5
	C	Strong & Weak Argument	CO5
	Unit 3	**Quantitative Aptitude**	
	A	Work & Time ,Pipes & Cistern	CO6
	B	Time ,Speed & Distance, Quadratic & Linear Equations, Logs & Inequalities	CO6
	C	Sequence & Series, Logarithms, Data Interpretation | Data sufficiency - Level 1	CO6
	Unit 4	**Verbal Abilities-3**	
	A	Cloze Test	CO3
	B	Sentence Rearrangement	CO3
	Unit 5	**Charisma Building**	
	A	How to Build Charisma	CO2
	B	Steps Towards Building a Charisma	CO2
	Weightage Distribution	*CA MTE ETE* ***25% 25% 50%***	
	Text book/s*	*Wiley's Quantitative Aptitude-P Anand* | ***Quantum CAT – Arihant Publications*** | ***Quicker Maths- M. Tyra*** | *Power of Positive Action (English, Paperback, Napoleon Hill)* | *Streets of Attitude (English, Paperback, Cary Fagan, Elizabeth Wilson) The 6 Pillars of self-esteem and awareness – Nathaniel Brandon* | *Goal Setting (English, Paperback, Wilson Dobson*	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	-	1	-	-	1	2	-	-
CO2	-	-	-	-	-	1	-	-	1	2	-	-
CO3	-	-	-	-	-	-	-	-	1	2	-	-
CO4	1	-	-	-	-	-	-	-	1	2	-	-
CO5	1	-	-	-	-	-	-	-	1	2	-	-
CO6	1	-	-	-	-	-	-	-	1	2	-	-

School:		**Sharda School of Engineering & Technology**	
Department		**Computer Science & Applications**	
Batch		**2023-25, Academic Year: 2024-25**	
Programme:		**MSc(CS)**	
Semester		**III**	
1	Course Code	MCP168	
2	Course Title	Object Oriented Programming Using Java Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory/Elective	
5	Course Objective	To implement Java language syntax and semantics and concepts such as classes, objects, inheritance, polymorphism, packages and multithreading.	
6	Course Outcomes (must be 6 COs, following verbs given in Bloom's Taxonomy)	CO1: Demonstrate Java environment and executing Java Programs CO2: Understand and formulate the problems in basic programming constructs CO3: Applying OOP concepts to solve real world problems CO4: Implement inheritance and polymorphism features of Java CO5: Implementing multithreading to enhance efficiency and handle run time errors CO6: Develop Java programs for software development	
7	Course Description	Apply features of OOPS and Java Programming including objects, classes, methods, parameter passing, information hiding, inheritance and polymorphism are discussed.	
8	Outline syllabus		CO Mapping
	Unit 1	**JDK, IDE installation and program execution**	
		installing JDK, configuring the path, installation and applications of IDE, Creating Java code, running programs using the JVM and .class files	CO1
	Unit 2	**Programming revisited**	
		Different data type programs, expression promotion rules, type casting and narrowing, logical-bit wise arithmetic operators, Using break and continue, for, while, do, and while loop control structures, if.. else, switch.. case. Command line arguments, keyboard input, Java arrays, and hierarchical control structures .	CO2, CO3
	Unit 3	**Class, object and constructor**	
		Programs that define classes, specify data members and member functions, build objects, and allow access to class members via those objects, programs that define constructors, set instance variables, overload methods, and overload constructors.	CO2, CO3, CO6
	Unit 4	**Inheritance, package and Interface**	
		Several types of inheritance, method overriding, multiple inheritance through interfaces, inheritance in interfaces, private, protected, and public mode programs	CO3, CO4, CO6
	Unit 5	**I/O, Exception and Multithreading**	
		User defined exceptions, nested try catch, rethrowing exceptions, and programs that employ try.. catch.. finally for exception handling Applications that extend the Thread class and implement the Runnable interface can run and control many threads.	CO3, CO5, CO6
	Mode of examination	Jury/Practical/Viva	

	Weightage Distribution	CA	CE (Viva)	ETE	
		25%	25%	50%	
	Text book/s*	1. Schildt H, "The Complete Reference JAVA2", TMH			
	Other References	1. Balagurusamy E, "Programming in JAVA", TMH Professional Java Programming: BrettSpell, WROX Publication			

PO and PSO mapping with level of strength for Course Name Introduction to OOP using Java Lab (MCP168)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCP_ 168 OOP using Java Lab	**CO1**	1			2	2					2	1	1
	CO2	2			2	2					2	2	2
	CO3	2	3	3	3	2					2	2	3
	CO4	3			3	2					2	2	2
	CO5	3			3	2					2	2	2
	CO6	3	3	3	3	2					2	3	3

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCP168	**OOP Using Java Lab**	2.3	3	3	2.5	3					2	2	2

Strength of Correlation
1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

List of Experiments

Unit No	S. No.	Name of the Practical
1	1.1	Write a Java program to print 'Hello' on screen and then print your name on a separate line.
	1.2	Write a Java program to print the sum (addition), multiply, subtract, divide and remainder of two numbers.
2	2.1	WAP in java to product of two numbers. Also, take input by the user.
	2.2	WAP in java to implement implicit and explicit type casting
	2.3	WAP in java to implement the various operators in java
	2.4	WAP in java to illustrate the concept of local, instance and static variable
3	3.1	WAP in Java with two classes create an object of first class and call into another class (having main method)
	3.2	WAP in Java for constructor overloading
		Write a program in java to demonstrate method overloading
	3.3	WAP in Java for method overriding.
		WAP in java to show run time polymorphism (up casting)
4	4.1	Write a program in java to demonstrate multilevel inheritance in java.

	4.2	Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
5	5.1	WAP in Java for exception handling by using try, catch and finally
	5.2	WAP in Java for throw and throws Exception
	5.3	WAP in Java to throw your own Exceptions
	5.4	WAP in Java how to create thread using Thread Class.
	5.5	WAP in Java how to create thread using a runnable interface.
	5.6	WAP in Java to implement the multithreading.

School:		**Sharda School of Engineering & Technology**	
Department		**Computer Science & Applications**	
Batch		**2023-25, Year 2024-25**	
Programme:		**MSc(CS)**	
Semester:		**III**	
1	Course Code	MCP267	
2	Course Title	Design and Analysis of Algorithms Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory/Elective	
5	Course Objective	Learn how to analyze a problem and design the solution for the problem. 1. Design and implement efficient algorithms for a specified application. 2. Strengthen the ability to identify and apply the suitable algorithm for the given real world problem.	
6	Course Outcomes (must be 6 COs, following verbs given in Bloom's Taxonomy)	CO1: Design algorithms using divide and conquer methods. CO2: Demonstrate the object-oriented concepts such as class, inheritance, Exception and Multithreading. CO3: Analyze the performance of merge sort and quick sort algorithms using divide and conquer technique. CO4: Analyze the performance of searching algorithms. CO5: Analyze the tree traversals and graph traversals using divide and conquer technique. CO6: Design algorithms using dynamic programming and back tracking methods.	
7	Course Description	Apply	
8	Outline syllabus		CO Mapping
	Unit 1	Quick and Merge Sort	
		a. Sort a given set of elements using the quick sort method and determine the time required to sort the elements. b. Implement merge sort algorithm to sort a given set of elements and determine the time required to sort the elements.	CO1, CO3
	Unit 2	Warshall's Algorithm	
		a. Obtain the Topological ordering of vertices in any digraph. b. Compute the transitive closure of a given directed graph using Warshall's algorithm.	CO1, CO5
	Unit 3	Knapsack Problem and Shortest Path Algorithm, and Minimum Spanning Tree	CO2, CO3
		a. Implement 0/1 Knapsack problem using Dynamic Programming. b. From a vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm. c. Find Minimum Cost Spanning Tree of a undirected graph using Kruskal's algorithm.	CO2, CO4
	Unit 4	Tree and Graph Traversals	
		a. Perform various tree traversal algorithms for a tree. b. Print the nodes reachable from a starting node in a digraph using BFS method.	CO2, CO5
	Unit 5	Back tracking	
		Implement N Queen's problem using Back Tracking.	CO2, CO6

		Perform a back tracking program using dynamic programming.			
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	CE (Viva)	ETE	
		25%	25%	50%	
	Text book/s*	Levitin A, "Introduction to the Design And Analysis of Algorithms", Pearson Education, 2008.			
	Other References	1. Goodrich M.T.,R Tomassia, "Algorithm Design foundations Analysis and Internet Examples", John Wileyn and Sons, 2006. 2. Base Sara, Allen Van Gelder ," Computer Algorithms Introduction to Design and Analysis", Pearson, 3rd Edition, 1999.			

PO and PSO mapping with level of strength for Course Name Design and Analysis of Algorithms Lab (MCP267)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCP267 Design and Analysis of algorithms Lab	**CO1**	2	2	2	1	1	-	-	-	-	1	3	1
	CO2	2	1	1	1	1	-	-	-	-	1	1	1
	CO3	2	2	2	1	1	-	-	-	-	1	3	1
	CO4	2	2	2	1	1	-	-	-	-	1	3	1
	CO5	2	2	2	1	1	-	-	-	-	1	3	1
	CO6	22	2	2	1	1	-	-	-	-	1	3	1

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCP267	Design and Analysis of algorithms Lab	2	1.83	1.83	1	1	-	-	-	-	1	2.66	1

Strength of Correlation
1. Addressed to ***Slight (Low=1) extent***
2. Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

List of Experiments

Unit No	S. No.	Name of the Practical
1	1.1	Sort a given set of elements using the quick sort method and determine the time required to sort the elements.
	1.2	b. Implement merge sort algorithm to sort a given set of elements and determine the time required to sort the elements.
2	2.1	Obtain the Topological ordering of vertices in any digraph.
	2.2	Compute the transitive closure of a given directed graph using Warshall's algorithm.
3	3.1	Implement 0/1 Knapsack problem using Dynamic Programming.

	3.2	From a vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm
	3.3	Find Minimum Cost Spanning Tree of a undirected graph using Kruskal's algorithm.
4	4.1	Perform various tree traversal algorithms for a tree.
	4.2	Print the nodes reachable from a starting node in a digraph using BFS method.
5	5.1	Implement N Queen's problem using Back Tracking
	5.2	Perform a back tracking program using dynamic programming.

TERM-IV

School: SSET		**Batch: 2023-25**	
Department		**Computer Science & Applications**	
Programme: MSc(CS)		**Current Academic Year: 2024-25**	
Semester:		**IV**	
1	**Course Code**	**MCT306**	
2	**Course Title**	**C# with ASP.Net**	
3	**Credits**	**3**	
4	**Contact Hours (L-T-P)**	**3-0-0**	
	Course Status	Program Elective 3	
5	Course Objective	Understand the fundamentals of object-oriented concept in C#, defining classes, objects, invoking methods inheritance, interfaces and exception handling mechanisms. To develop skills in analyzing the usability of a web and understand the fundamentals of ASP.NET with ADO.NET.	
6	Course Outcomes	**After successfully completion of this course students will be able to:** CO1: Understand the philosophy and architecture of .NET Framework. CO2: Describe the fundamental of C# programming language and learn how to build object oriented applications using C#. CO3: Explain the concept of Namespace system, multithreading and exception handling. CO4: Implement the ASP.Net web controls in web form. CO5: Apply the validation controls and ADO.NET. CO6: Develop real world problems using C# & ASP.NET.	
7	Course Description	Basic Object-Oriented Programming (OOP) concepts, including objects, classes, methods, parameter passing, information hiding, inheritance and polymorphism are introduced and their implementations using C# are discussed. ASP.NET and ADO.NET are discussed to give basic understanding and its implementation to design the web pages.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to .Net framework & components**	
	A	Introduction, The Origin of .Net Technology, Common Language Runtime (CLR),	CO1, CO2
	B	Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL),	CO1, CO2
	C	Just-In –Time Compilation, Framework Base Classes, Assemblies and its types	CO1, CO2
	Unit 2	**Introduction to C# with class and object**	
	A	Introduction, Data Types, Identifiers, Variables, Constants, Literals, Type conversion, Array and Strings,	CO1, CO2
	B	Object and Classes, Abstraction, Encapsulations & Data hiding, Inheritance	CO1, CO2
	C	Polymorphism, Operator Overloading, Interfaces, Delegates and Events.	CO2, CO6
	Unit 3	**Namespace-System, Multi-threading and Exception handling**	
	A	Namespace- System, Access Modifiers: Public, Private, Protected, Internal and Protected Internal	CO3, CO6
	B	Introduction to Multi-Threading: creating thread using Thread class, Thread life cycle, sleep, join, abort and Thread priority	CO3, CO6
	C	Managing Console, I/O Operations, Input-Output in C#, Error Handling: try, catch, throw and throws, Checked and Unchecked exceptions, User define exception	CO3, CO6
	Unit 4	**ASP.NET Controls**	
	A	ASP.NET Web Controls: ASP.Net Life cycle, Differentiate Client side and Server-side controls.	CO4, CO6
	B	Label, Textbox, Button Controls, Drop-down list, List box,	CO4, CO6
	C	Radio Button list, Check box list, File Upload, Data Grid, Grid View	CO3, CO6
	Unit 5	**ASP.NET validation controls & ADO.NET**	
	A	ASP.NET Validation: Compare Validator, Range Validator, Regular Expression Validator, Required Field Validator, Validation Summary	CO5, CO6
	B	ADO.Net: Introduction to ADO.Net. Architecture ADO.NET, Data Set, Data Table,	CO5, CO6
	C	Data Row, Data Adapter, Data Reader, DB Command and DB Connection Objects	CO5, CO6

	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1 Balagurusamy," Programming with C#", (TMH) 2 Shibi Parikkar, " C# with .Net Frame Work" , Firewall 3 Media.ASP.NET: The Complete Reference: Matthew Macdonald			
	Reference Books	1 Mark Michaelis, "Essential C# 3.0: For .NET Framework 4.5, 2/e, Pearson Education 2 Fergal Grimes," Microsoft .Net for Programmers". (SPI)			

CO and PO Mapping

Sl. No.	Course Outcome (CO)	
1.	CO1: Understand the philosophy and architecture of .NET Framework.	PO1, PO2
2.	CO2: Describe the fundamental of C# programming language and learn how to build object-oriented applications using C#.	PO1, PO2, PO4
3.	CO3: Explain the concept of Namespace system, multithreading and exception handling.	P01, PO2, PO3, PO4, PO10, PSO1
4.	CO4: Implement the ASP.Net web controls in web form.	PO1, PO2, PO3, PO10
5.	CO5: Apply the validation controls and ADO.NET.	PO2, PO3, PO4, PO10
6.	CO6: Develop real world problems using C# & ASP.NET.	PO1, PO2, PO3, PO4, PO5, PO6, PO8, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name C# with ASP.Net **(MCT306)**

Course Code_ Course Name	COs	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
C# with ASP .NET **MCT306**	**CO1**	**3**	**2**	-	-	-	-	-	-	-	**2**	-	-
	CO2	2	3	-	2	-	-	-	-	-	-	-	-
	CO3	**2**	**3**	**2**	**3**	-	-	-	-	-	**2**	2	-
	CO4	2	3	**2**	-	-	-	-	-	-	**2**	-	-
	CO5	-	2	**2**	3	-	-	-	-	-	**2**	**2**	**1**
	CO6	**2**	**3**	**2**	**3**	**3**	**2**	-	**2**	-	**2**	**2**	**2**

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCT306	C# with ASP .NET	**2.2**	**2.67**	**2**	**2.75**	**3**	**2**	**0**	**2**	**0**	**2**	**2**	**1.5**

School: SSET		**Computer Science & Applications**	
Batch:		**2023-25**	
Programme: **MSc(CS)**		**Current Academic Year: 2024-25**	
Semester:		**IV**	
1	Course Code	MCT359	
2	Course Title	Introduction to PHP with MySQL	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Core/Compulsory	
5	Course Objective	To design & develop secure web pages using server side scripting (frontend and backend)	
6	Course Outcomes	On successful completion of the course, the student will: CO1: Define the basic concepts of PHP. CO2: Understand how server-side programming works on the web CO3: Apply PHP script to handle HTML forms CO4: Discover PHP programs that use various PHP library functions, and that manipulate files and directories. CO5: Appraise and solve various database tasks using the MySQL language CO6: Develop Websites for Small business and organization or for individual	
7	Course Description	This course introduces Concepts for PHP and learns Form handling, Session Management. How we can develop dynamic websites. It will also help students to build applications according to their problem statements.	
8	Outline syllabus		CO Mapping
	Unit 1	**PHP Basics**	
	A	Introduction to PHP , Working with PHP, Why PHP?, Basic Syntax of PHP	CO1,CO2
	B	PHP statement terminator and case insensitivity, Embedding PHP in HTML	CO1,CO2
	C	Comments, Variables, Assigning value to a variable, Constants, Managing Variables, Understanding variable scope, Global Variables, Static Variables	CO1,CO2
	Unit 2	**Operators, Control Structures and Functions in PHP**	
	A	Arithmetic Operators, Bit-wise Operators, Comparison Operators, Logical Operators, Concatenation Operator, Incrementing/Decrementing Operator, Ternary Operator	CO1,CO2,CO6
	B	Conditional Control Structures: If statement, If- else statement, If-else if statement, Nested If, Switch statement, Looping Control Structures: For loop, While loop, Do- While loop, For-each	CO1,CO2,CO6
	C	Functions, User-Defined function, Function Definition, Function with arguments, Function with return value, Call by value and call by references, Built-in functions in PHP.	CO1,CO2,CO4
	Unit 3	**Array and Form Handling**	
	A	Array: single, multi-dimensional, numeric array, associative array	CO6
	B	Accessing form elements using GET and POST, Assigning value to form elements	CO3,CO6

	C	Form validation: validation, required, validate url, dealing with uploaded file, error handling	CO3,CO6
	Unit 4	**File Handling & Session Management**	
	A	Opening files in different modes, handling file open error	CO4,CO6
	B	File Operation: Reading & writing data on web page from file, deleting file, renaming file	CO4,CO6
	C	Session Management: introduction, creation, destroying and login session management	CO4,CO6
	Unit 5	**My SQL**	
	A	MySQL Basic query: create, insert, select, delete, update, truncate, drop, where	CO5,CO6
	B	MySQL ORDER BY, Joins, Union Operator, Introduction to database, database connectivity	CO5,CO6
	C	MySQL Database, create DB, Primary Key, Drop table Check, Default, Retrieving records, retrieving fields from record, closing connection	CO5,CO6
	Mode of examination	Theory	

	Weightage Distribution	CA	MTE	ETE
		25%	25%	50%
	Text book/s*	1. Peter MacIntyre, Rasmus Lerdorf, Kevin Tatroe,"Programming PHP", O'Reilly Publication		
	Other References	1. Steven Holzner, "Php: The Complete Reference", TMH publication 2. Ivan Bayross,"Web Enabled Commercial Applications Development Using HTML, JavaScript, DHTML and PHP",4th revised Edition, BPB Publication		

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Define the basic concepts of PHP.	PO1,PO2,PO3,PO4,PO5,PO8,PO10
2.	CO2: Understand how server-side programming works on the web	PO3,PO4,PO10,PS02
3.	CO3: Apply PHP script to handle HTML forms	PO3,PO4,PO8,PO10
4.	CO4: Discover PHP programs that use various PHP library functions, and that manipulate files and directories.	PO3,PO4,PO10
5.	CO5: Appraise and solve various database tasks using the MySQL language	PO3,PO4,PO8,PO10,PSO2
6.	CO6: Develop Websites for Small business and organization or for individual	PO1,PO2,PO3,PO4,PO5,PO8,PO10,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Introduction to PHP with MySQL

	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
	CO1	2	2	2	2	2	-	-	3	-	2	-	-
	CO2	-	-	2	1	-	-	-	-	-	2	-	1
	CO3	-	-	2	1	-	-	-	2	-	2	-	-
	CO4	-	-	2	1	-	-	-	-	-	2	-	-

	CO5	-	-	2	1	-	-	-	1	-	2	-	2
	CO6	2	2	2	3	3	1	-	3	-	3	3	2
Course Code	**Course Name**	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**
MCT359	Name Introduction to PHP and MySQL	2.00	2.00	2.00	1.50	2.50	1.00	-	2.25	-	2.17	3.00	1.67

Average of non-zeros entry in following table (should be auto calculated).

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

Syllabus- Introduction to R Programing

School: SSET		**Batch: 2023-2025**	
Department		**Computer Science & Applications**	
Programme: MSc(CS)		**Academic Year: 2024-25**	
Semester:		**IV**	
1	Course Code.	MCT360	
2	Course Title	Introduction to R Programming	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course status	Compulsory	
5	Course Objectives	To familiarize the students with the basics of programming in R language, and its applications in data analysis.	
	Course Outcomes	Upon successful completion of this course, student will be able to: CO1: Demonstrate R programming using Decision statements, Loops and Functions. (K3) CO2: Apply functions to improve readability of programs. (K3) CO3: Select and construct programs using different data structures available in R. (K1, K3) CO4: Summarize data using descriptive statistics and perform distribution analysis. (K2, K4) CO5: Design visualizations of data using different types of graphs and plots. (K5) CO6: Estimate data using complex statistical testing. (K6)	
7	Course Description	R is a programming language and software environment for statistical analysis, graphics representation and reporting. This course provides an introduction to the basics of programming in R, and its applications in data analysis.	
8	**Outline syllabus:**		CO Mapping
	Unit 1	**Introduction to R Programming, Decisions, Loops and Functions**	
	A	Introduction to R Programming, R-Studio Installation (GUI): R Windows Environment, Simple Math in R	CO1
	B	Introduction to Data Types, Variables, Operators	CO1
	C	Decision Statements, R Loops, R Functions	CO2
	Unit 2	**Data Structures in R**	
	A	Introduction to Arrays, Working with Strings	CO3
	B	Data Structures/ Objects in R: Vector, List, Matrix, Factor, Data Frame	CO3, CO2, CO6
	C	Conversion of Data Objects: Matrix to Data frame, Data frame to Matrix, Data Frame to list, Matrix to list.	CO3, CO2
	UNIT 3	**Descriptive Statistics**	
	A	Reading Datasets, Working with different file types .txt, .csv etc., Combining Datasets	CO4
	B	Descriptive Statistics and Tabulation: Summarizing data with R, Contingency Tables	CO4
	C	Data Distribution Analysis: Shapiro Wilk Test, Kolmogorov Smirnov, Quantile Plots	CO4
	Unit 4	**Data Visualization in R**	

	A	Load data in R environment and plotting a graph, histograms (equal class intervals and unequal class intervals), Bar Chart, Box plot,			CO5
	B	Stem-leaf plot, Scatter Plot, Line Chart, Pie chart,			CO5, CO6
	C	Customization of plot settings, adding text, saving plot to a file, adding legends.			CO5, CO6
	Unit 5	**Hypothesis Testing and Correlation Analysis**			
	A	Hypothesis Testing: Student t test, Mann Whitney Test			CO6
	B	Correlation Analysis, Random number generation and sampling procedures.			CO6
	C	Complex Statistics: One way and two-way ANOVA			CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Gardener, M (2012): Beginning R: The Statistical Programming Language, Wiley Publications. 2. Braun W J, Murdoch D J (2007): A First Course in Statistical Programming with R. Cambridge University Press. New York			
	Other References	1. Crawley, M.J. (2015): Statistics: An Introduction Using R, 2nd Edition. Wiley. 2. Crawley, M.J. (2012): The R Book, 2nd Edition. Wiley.			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1. Demonstrate R programming using Decision statements, Loops and Functions.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
2.	CO2. Apply functions to improve readability of programs	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
3.	CO3. Select and construct programs using different data structures available in R.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
4.	CO4. Summarize data using descriptive statistics and perform distribution analysis.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
5.	CO5. Design visualizations of data using different types of graphs and plots.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
6.	CO6. Estimate data using complex statistical testing.	PO1, PO2, PO3, PO4, PO8, PO 10, PSO1

PO and PSO mapping with level of strength for Course Name Introduction to R Programming (Course Code MCT360)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCT360 Introduction to R Programming	CO1	2	1	1	2	-	-	-	2	-	-	2	-
	CO2	2	2	2	2	-	-	-	2	-	-	2	-
	CO3	2	2	1	2	-	-	-	2	-	-	2	-
	CO4	2	2	2	2	-	-	-	2	-	-	2	-
	CO5	2	2	2	2	-	-	-	2	-	-	2	-
	CO6	3	3	2	2	-	-	-	2	-	-	2	-

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCT360	**Introduction to R Programming**	**2.1**	**2**	**1.7**	**2**	-	-	-	**2**	-	-	2	

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***

School: SSET		**Batch :** 2023-2025
Department		**Computer Science & Applications**
Programme: MSc(CS)		**Current Academic Year:** 2023-2024
Semester:		**IV**
1	Course Code	**ARP 308**
2	Course Title	**Personality Development**
3	Credits	2
4	Contact Hours (L-T-P)	1-0-2
	Course Status	Active
5	Course Objective	To enhance holistic development of students and improve their employability skills. Provide a 360 degree exposure to learning elements of Business English readiness program, behavioural traits, achieve softer communication levels and a positive self-branding along with augmenting numerical and altitudinal abilities. To up skill and upgrade students' across varied industry needs to enhance employability skills. By the end of this semester, a will have entered the threshold of his/her 4th phase of employability enhancement and skill building activity exercise.
6	Course Outcomes	After completion of this course, students will be able to: CO1: Develop a creative resumes, cover letters, interpret job descriptions and interpret KRA and KPI statements and art of conflict management. CO2: Build negotiation skills to get maximum benefits from deals in practical life scenarios. CO3: to Develop skills of personal branding to create a brand image and self-branding CO4: Acquire higher level competency in use of logical and analytical reasoning such as direction sense, strong and weak arguments CO5: Develop higher level strategic thinking and diverse mathematical concepts through building analogies, odd one out CO6: Demonstrate higher level quantitative aptitude such as average, ratio & proportions, mixtures & allegation for making business decisions.
7	Course Description	This penultimate stage introduces the student to the basics of Human Resources. Allows the student to understand and interpret KRA | KPI and understand Job descriptions. A student also understands how to manage conflicts, brand himself/herself, understand relations and empathize others with level-4 of quant, aptitude and logical reasoning
8	syllabus – ARP 308	

	Unit 1	**Ace the Interview**	**CO MAPPING**
	A	HR Sensitization (Role Clarity | KRA | KPI | Understanding JD) | Conflict Management	CO1
	B	Negotiation Skills | Personal Branding	CO3, CO4
	C	Uploading & Curating Resumes in Job Portals, getting Your Resumes Noticed | Writing Cover Letters | Relationship Management	CO1, CO3
	Unit 2	**Introduction to APTITUDE TRAINING- Reasoning- Logical/ Analytical**	
	A	Sitting Arrangement & Venn Diagrams | Puzzles | Distribution | Selection	CO4
	B	Direction Sense | Statement & Conclusion | Strong & Weak Arguments	CO4
	C	Analogies, Odd One out | Cause & Effect	CO5
	Unit 3	**Quantitative Aptitude**	
	A	Average , Ratio & Proportions, Mixtures & Allegation	CO6
	B	Geometry-Lines, Angles & Triangles	CO6
	C	Problem of Ages | Data Sufficiency - L2	CO6

	Unit 4	**Verbal Abilities-4**	
	A	Antonyms and Synonyms	CO1
	B	Idioms and Phrases	CO2
	Unit 5	**Problem Solving and Case Studies**	
	A	Real time Case Study Solving Exercises	CO4
	B	Intra student Mock Situation Handling Exercises	CO4
	Weightage Distribution	*CA MTE ETE* ***25% 25% 50%%***	
	Text book/s*	Wiley's Quantitative Aptitude-P Anand | **Quantum CAT – Arihant Publications | Quicker Maths- M. Tyra |** Power of Positive Action (English, Paperback, Napoleon Hill) | Streets of Attitude (English, Paperback, Cary Fagan, Elizabeth Wilson) The 6 Pillars of self-esteem and awareness – Nathaniel Brandon | Goal Setting (English, Paperback, Wilson Dobson	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	1	2	-	-
CO2	-	-	-	-	-	-	-	-	1	2	-	-
CO3	-	-	-	-	-	-	-	-	1	2	-	-
CO4	1	-	-	-	-	-	-	-	1	2	-	-
CO5	1	-	-	-	-	-	-	-	1	2	-	-
CO6	1	-	-	-	-	-	-	-	1	2	-	-

School: SSET		**Batch: 2023-25**			
Department		**Computer Science & Applications**			
Programme: MSc(CS)		**Current Academic Year: 2024- Computer Science & Applications 25**			
Semester:		**IV**			
1	**Course Code**	**MCP306**			
2	**Course Title**	**C# with ASP.Net Lab**			
3	**Credits**	**1**			
4	**Contact Hours (L-T-P)**	**0-0-2**			
	Course Status	Program Elective 3			
5	Course Objective	This course is prepared for the beginners to help them to understand basics of C# along with classes, objects, invoking methods inheritance, interfaces and exception handling mechanisms and ASP.NET programming. After completing this course, students will be able to find yourself at a moderate level in ASP.NET using C# programming from where you can take yourself to next levels.			
6	Course Outcomes	**After successfully completion of this course students will be able to:** CO1: Demonstrate C# environment and executing C# Programs. CO2: Understand and formulate the problems in basic programming constructs using C#. CO3: Applying OOP concepts to solve real world problems. CO4: Implement inheritance, polymorphism, multithreading features using C# and handle run time errors. CO5: Apply the validation controls in web forms and connect with database using ADO.NET. CO6: Develop real world problems using C# & ASP.NET.			
7	Course Description	ASP.NET is a web application framework developed and marketed by Microsoft to allow programmers to build dynamic web sites. It allows you to use an object-oriented programming language such as C# to build web applications easily			
8	Outline syllabus				CO Mapping
	Unit 1	**Visual Studio installation and program execution**			
		Installing Visual-Studio, uses of IDE, Writing C# programs, program execution, Programs on different data types, promotion rules in expressions, narrowing & type casting, logical-bit wise-arithmetic operators.			CO1, CO2
	Unit 2	**Programming revisited**			
		Programs using if .. else, switch .. case statements, for, while, do. while loop control structures, break and continue Programs using command line arguments, taking input from keyboard, Arrays, nested control structures.			CO2, CO6
	Unit 3	**class, object and constructor**			
		Programs to define classes, defining data members & member function, create objects, accessing members of a class through objects, Programs to define constructors, initializing instance variables, method overloading, constructor overloading.			CO3, CO6
	Unit 4	**Inheritance, package, Interface, Exception and Multithreading**			
		Programs on different types of inheritance, method overriding, achieving multiple inheritance through interfaces, inheritance in interfaces, private, protected and public mode, try. catch. finally for exception handling, throw user defined exceptions, uses of throws, nested try catch, rethrowing exceptions. Programs to define Thread, achieving multithreading using Thread class.			CO4, CO6
	Unit 5	**ASP.NET, Validation and ADO.NET**			
		Design the Web Forms using ASP.NET controls, Validations using various validators in VS. Establish the connection using ADO.NET component in connected and Dis-connected mode.			CO5, CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	

	Text book/s*	1 Balagurusamy," Programming with C#", (TMH) 2 Shibi Parikkar, " C# with .Net Frame Work", Firewall 3 Media.ASP.NET: The Complete Reference: Matthew Macdonald	
	Reference Books	1 Mark Michaelis, "Essential C# 3.0: For .NET Framework 4.5, 2/e, Pearson Education 2 Fergal Grimes," Microsoft .Net for Programmers". (SPI)	

CO and PO Mapping

Sl. No.	Course Outcome (CO)	
1.	CO1: Demonstrate C# environment and executing C# Programs.	PO1, PO2
2.	CO2: Understand and formulate the problems in basic programming constructs using C#.	PO1, PO2, PO4
3.	CO3: Applying OOP concepts to solve real world problems.	P01, PO2, PO3, PO4, PO10, PSO1
4.	CO4: Implement inheritance, polymorphism, multithreading features using C# and handle run time errors.	PO1, PO2, PO3, PO10
5.	CO5: Apply the validation controls in web forms and connect with database using ADO.NET	PO2, PO3, PO4, PO10
6.	CO6: Develop real world problems using C# & ASP.NET.	PO1, PO2, PO3, PO4, PO5, PO6, PO8, PO10, PSO1, PSO2

PO and PSO mapping with level of strength for Course Name C# with ASP.Net **(MCP306)**

Course Code_ Course Name	COs	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCP306 C# with ASP.Net Lab	**CO1**	**3**	**2**	-	-	-	-	-	-	-	**2**	-	-
	CO2	2	3	-	2	-	-	-	-	-	-	-	-
	CO3	**2**	**3**	**2**	**3**	-	-	-	-	-	**2**	2	-
	CO4	2	3	**2**	-	-	-	-	-	-	**2**	-	-
	CO5	-	2	**2**	3	-	-	-	-	-	**2**	**2**	**1**
	CO6	**2**	**3**	**2**	**3**	**3**	**2**	-	**2**	-	**2**	**2**	**2**

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCP306	C# with ASP.Net Lab	**2.2**	**2.67**	**2**	**2.75**	**3**	**2**	**0**	**2**	**0**	**2**	**2**	**1.5**

List of Programs

Write a Simple Program to print your name in C#
Write a program to print the given string by using the Write and Write Line Method.
Write a program how to read the values form console given by the user using Read Line Method
Write a program to make a function (addition of Two numbers) in Single Class
Write a program to make a function in first class (addition of Two numbers) and call a function by creating object of first class in to second class and inputs given by the user.

Write a program to make a function in first class and call a function into second class by declare static method of first class
Write a program to print the element of collections (like. Array) by using For each Loop.
Write a program to print the element of an Array by using For each Loop and inputs given by the user.
Write a program to print the tables from 1 to 10 by using the 2- Dimensional Array
Write a program to implements the methods and properties on Array (like: Get Length(),Get Value Get Length(),,Copy To(),Reverse(),Length)
Write a program to print the elements by using Jagged Array with For each Loop.
Write a program to print the elements by using the Array List Class and inputs given by the user.
Write a program to implements the methods and properties on Array List. (like: Add(),Clear(),Insert(),Remove(),Sort(), Count, Capacity).
Write a program to display the given string by using Immutable String (String Class).
Write a program to implements the methods and properties on string (like: Compare(),Compare To(), Concat(),Trim(),Insert()).
Write a program to display the given sting by using Mutable String (String Builder Class).
Write a program to implements the methods and properties on String Builder (like: Compare(),Compare To(),Concat(),Trim(),Insert()).
Write a program to create a class for Room and make a Constructor & Destructor for Room Class and then use the Construct to pass the values in method for Area and display it.
Write a program to calculate the Area of Circle by using the Parameterized Constructor and inputs given by the user (Length, Width).
Write a program to calculate the Area of Rectangle and perimeter by using the Constructor Overloaded and inputs given by the user (Length, Width)
Write a program to calculate the Area of Room and inherit the base class and calculate the volume of Room in second class and then display the area and volume (Single Inheritance).
Write a program to design a class vehicle, car and bike by using Multi Level inheritance and then call the method of vehicles, car and bike by creating object of bike class (Multi -level inheritance).
Write a program to implement the interfaces which contains the methods Addition, Multiplication respectively and create a new class which implement both methods and display the output of these methods by creating a new class.
Write a program to create a class and make a function for Multiplication for two numbers and overload the existing function then display the output.
Write a program how the unary minus operator is overloaded
Write a program how the binary plus operator is overloaded on addition of two complex numbers.
Write a program to create a class and make the function Display and override the existing Function by using the Virtual and Override keywords.
Write a program how a delegate is created and used in program.
Write a program to Create the Multicast delegate by call the several methods in one call.
Write a program to simulate a calculator by using the delegate
Write a program to create the two event handler of an event and implement by the delegate.
Write a program to handle an arithmetic exception by using try and multiple catch blocks.
Write a program to handle an arithmetic exception by using try and finally block.
Write a program how to create a thread and starts it running
Write a program how to create the multiple thread in a program
Write a program how to manage the priority of threads

Write a program to implement the methods of thread (like: Wait (), Suspend (), Resume (), Abort ()).
Write a program to connect the SQL Database by using the ADO.Net
Write a program to connect the Ms Access by using the ADO.Net
Write a program to illustrate the concept of Connected Mode by using ADO.Net
Write a program to illustrate the concept of Dis-connected Mode by using ADO.Net
Write a program to implement the Pointer in C # by using unsafe mode.
Create a Simple web application by using ASP.Net and Connect with SQL Database and also perform some operation (like: Insert, Update, Delete and Select).

School: SSET		**Batch: 2023-25**	
Department		**Computer Science & Applications**	
Programme: MSc(CS)		**Current Academic Year: 2024-25**	
Semester:		**IV**	
1	Course Code	MCP359	
2	Course Title	Introduction to PHP with MySQL Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Core/Compulsory	
5	Course Objective	This course introduces the open source Web scripting language PHP and helps in building dynamic Web applications. It defines the Semantics and syntax of the PHP language. It defines SQL commands and query processing using PHP and SQL integration.	
6	Course Outcomes (same as theory course)	CO1: Define regular expressions including modifiers and operators. CO2: Demonstrate PHP functions to solve mathematical and data structure problems CO3: Develop PHP scripts to handle HTML forms. CO4: Determine the PHP scripts for file handling and session management. CO5: Analyze and solve various database tasks using the SQL language. CO6: Solve common Web application tasks by writing PHP programs.	
7	Course Description	This course discusses the practical problems that PHP solves. It helps in developing server-side cross-platform HTML-embedded scripts to implement dynamic Web pages that interact with databases and files.	
8			CO Mapping
	Unit 1	**PHP Basics**	
	A	Write a program to print a message. Write a Program to calculate square of given number	CO1
	B	Write a PHP program to swap two variables.	
	C	Write a PHP program to find the area of rectangle, square, circle by taking user input	
	Unit 2	Operators, Control Structures and Functions in PHP	
	A	Write a PHP program to find factorial of a number. Write a PHP program to implement a calculator.	CO2
	B	Write a PHP Program for finding the Largest number in an array	
	C	Write a PHP Program for finding the smallest number in an array	
	Unit 3	Array and Form Handling	
	A	Write a program in PHP to sort the elements of an array in ascending order.	CO3

	B	Write a program in PHP to sort the elements of an array in descending order.			
	C	Write a program in PHP to create a form and validate the same.			
	Unit 4	File Handling & Session Management			CO4
	A	Write a program in PHP to upload a file			
	B	Write a program in PHP to implement file handling.			
	C	Write a program in PHP to perform session Management.			
	Unit 5	SQL and PHP Database Connectivity			CO5,CO6
	A	Write a program in PHP to Open and close a Connection to MySQL			
	B	Write a Program in PHP to select and Order Data From a MySQL Database			
	C	Create a PHP and SQL based website which stores the information of a Bank. Also include query processing using SQL.			
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	CE(Viva)	ESE	
		25%	25%	50%	
	Text book/s*	Peter MacIntyre, Rasmus Lerdorf, Kevin Tatroe,"Programming PHP", O'Reilly Publication			
	Other References	1. Steven Holzner, "Php: The Complete Reference", TMH publication 2. Ivan Bayross,"Web Enabled Commercial Applications Development Using HTML, JavaScript, DHTML and PHP",4th revised Edition, BPB Publication			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1: Define regular expressions including modifiers and operators.	PO1,PO2,PO3,PO4,PO10
2.	CO2: Demonstrate PHP programs that use various PHP library functions	PO1,PO2,PO3,PO4,PO10
3.	CO3: Develop PHP scripts to handle HTML forms.	PO1,PO3,PO4,PO8,PO10,PSO1
4.	CO4: Analyze and solve various database tasks using the SQL language.	PO1,PO3,PO4,PO8,PO10
5.	CO5: Determine the PHP script to validate form data.	PO3,PO4,PO8,PO10,PSO1
6.	CO6: Solve common Web application tasks by writing PHP programs.	PO1,PO2,PO3,PO4,PO5,PO8,PO10,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Introduction to PHP with SQL Lab

Course Code_ Course Name	**CO's**	**PO 1**	**PO 2**	**PO 3**	**PO4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO2**

MCP359 Introduction to PHP Lab	**CO1**	2	2	2	2						2		
	CO2	2	2	2	2						2		
	CO3	1		2	2				1		2	2	
	CO4	1		2	3				1		2		
	CO5			2	2				1		2	2	
	CO6	2	1	2	3	3			3		3	3	2

Average of non-zeros entry in following table (should be auto calculated).

Course Code	**Course Name**	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PSO 1**	**PSO 2**
MCP359	**Introduction to PHP lab**	1.6	1.67	2	2.3	3	0	0	1.5	0	2.67	2.3	2

List of Experiments

- Write a PHP program to print a message.
- Write a PHP program to find a square of a number.
- Write a PHP program to swap two numbers without using 3rd variable.
- Write a PHP program to find the area of rectangle, square, circle using predefined value.
- Write a PHP program to find factorial of a number
- Write a PHP program to print Fibonacci series up to 17.
- Write a PHP program to implement calculator.
- Write a PHP program to find the smallest number from an array.
- Write a PHP program to arrange the numbers in ascending order.
- Write a PHP program to make a login form and check the input using another PHP page.
- Write a PHP program to find the sum of all elements in a multidimensional array using for loop.
- Write a PHP program to validate a form input.
- Write a PHP program of file handling (reading a file line by line until end of file
- Write a PHP program for uploading a file in PHP.
- Write a program to read input data, from table and display all these information in tabular form on output screen.

Syllabus- Introduction to R Lab

School: SSET		**Batch: 2023-2025**	
Department		**Computer Science & Applications**	
Programme: MSc(CS)		**Academic Year: 2024-25**	
Semester:		**IV**	
1	Course Code.	MCP360	
2	Course Title	Introduction to R Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course status	Compulsory	
5	Course Objectives	To familiarize the students with the basics of programming in R language, and its applications in data analysis.	
	Course Outcomes	Upon successful completion of this course, student will be able to: CO1: Demonstrate R programming using Decision statements, Loops and Functions. (K3) CO2: Apply functions to improve readability of programs. (K3) CO3: Select and construct programs using different data structures available in R. (K1, K3) CO4: Summarize data using descriptive statistics and perform distribution analysis. (K2, K4) CO5: Design visualizations of data using different types of graphs and plots. (K5) CO6: Estimate data using complex statistical testing. (K6)	
7	Course Description	R is a programming language and software environment for statistical analysis, graphics representation and reporting. This course provides an introduction to the basics of programming in R, and its applications in data analysis.	
8	**Outline syllabus:**		CO Mapping
	Unit 1	**Introduction to R Programming, Decisions, Loops and Functions**	
	A	P1. Write a R Program to make simple calculate. P2. Write a R program to demonstrate the usage of different types of operators. P3. Write a R program to find whether a given year is leap year or not. P4. Write a R program to calculate factorial of a given number.	CO1, CO2
	Unit 2	**Data Structures in R**	
	A	P5. Write R programs to create vector using c, rep, paste and seq functions. P6. Write a R program to find transpose of a given matrix. P7. Write R programs to create and manipulate data frames.	CO3, CO2, CO6
	UNIT 3	**Descriptive Statistics**	
	A	P8. Write a R Program to print summary statistics of a given dataset. P9. Write a R Program to perform Shapiro Wilk Test, Kolmogorov Smirnov test. P10. Write a R program to plot quantile quantile plots.	CO4
	Unit 4	**Data Visualization in R**	
	A	P11. Write R programs to create bar chart, histogram, pie chart, scatter plot, line chart, stem leaf plot.	CO5, CO6
	Unit 5	**Hypothesis Testing and Correlation Analysis**	
	A	P12. Write R programs to implement Student t and Mann Whitney Test. P13. Write a R program to perform correlation analysis of a given dataset.	CO6

		P14. Write a R program to implement ANOVA technique.			
	Mode of examination	Practical/Jury/Viva			
	Weightage Distribution	CA	CE(Viva)	ETE	
		25%	25%	50%	
	Text book/s*	1. Gardener, M (2012): Beginning R: The Statistical Programming Language, Wiley Publications. 2. Braun W J, Murdoch D J (2007): A First Course in Statistical Programming with R. Cambridge University Press. New York			
	Other References	1. Crawley, M.J. (2015): Statistics: An Introduction Using R, 2nd Edition. Wiley. 2. Crawley, M.J. (2012): The R Book, 2nd Edition. Wiley.			

CO and PO Mapping

S. No.	Course Outcome	Programme Outcomes (PO) & Programme Specific Outcomes (PSO)
1.	CO1. Demonstrate R programming using Decision statements, Loops and Functions.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
2.	CO2. Apply functions to improve readability of programs	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
3.	CO3. Select and construct programs using different data structures available in R.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
4.	CO4. Summarize data using descriptive statistics and perform distribution analysis.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
5.	CO5. Design visualizations of data using different types of graphs and plots.	PO1, PO2, PO3, PO4, PO8, PO10, PSO1
6.	CO6. Estimate data using complex statistical testing.	PO1, PO2, PO3, PO4, PO8, PO 10, PSO1

PO and PSO mapping with level of strength for Course Name Introduction to R Programming Lab (Course Code MCP360)

Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
MCP360 **Introduction to R Lab**	**CO1**	2	1	1	2				2			2	
	CO2	2	2	2	2				2			2	
	CO3	2	2	1	2				2			2	
	CO4	2	2	2	2				2			2	
	CO5	2	2	2	2				2			2	
	CO6	3	3	2	2				2			2	

Average of non-zeros entry in following table (should be auto calculated).

Course Code	Course Name	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2

MCP360	**Introduction to R lab**	**2.1**	**2**	**1.7**	**2**	-	-	-	**2**	-	-	2	

Strength of Correlation

1. Addressed to ***Slight (Low=1) extent*** ***2.*** Addressed to ***Moderate (Medium=2) extent***
3. Addressed to ***Substantial (High=3) extent***