SHARDA UNIVERSITY
Beyond Boundaries

SCHOOL OF ENGINEERING AND TECHNOLOGY
Master of Science (Computer Science)

Programme Code: SET0127
Duration- 2 Years Full Time

PROGRAM STRUCTURE
AND
CURRICULUM & SCHEME OF EXAMINATION
2021

1. Standard Structure of the Program at University Level

1.1 Vision, Mission and Core Values of the University

Vision of the University

To serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship.

Mission of the University

1. **Transformative educational experience**
2. **Enrichment by educational initiatives that encourage global outlook**
3. **Develop research, support disruptive innovations and accelerate entrepreneurship**
4. **Seeking beyond boundaries**

Core Values

- **Integrity**
- **Leadership**
- **Diversity**
- **Community**

Note: Detailed Mission Statements of University can be used for developing Mission Statements of Schools/ Departments.

Vision of the School

To become a globally acclaimed institution of higher learning in engineering and technology promoting excellence in research, innovation and entrepreneurship

Mission of the School

1. **To impart quality education with strong industry & academic connectivity in the expanding fields of Engineering and Technology in a conductive and enriching learning environment.**
2. **To product technocrats equipped with technical & soft skills and experiential learning required to stay current with the modern tools in emerging technologies to fulfill professional responsibilities and uphold ethical values.**
3. **To inculcate a culture of interdisciplinary research, innovation and entrepreneurship to provide sustainable solutions to meet the growing challenges and societal needs.**
4. **To foster collaborative learning and to play adaptive leadership role in professional career and pursuit of higher education through effective mentoring and counseling.**

Core Values

- **Industry & Academic Connectivity**
- **Experiential learning**
- **Interdisciplinary research**
- **Global**

1.2 Vision and Mission of the Department

Vision of the Department

To be recognized as the fountainhead of excellence in technical knowledge and research in computer science and engineering to attract students and scholars across the globe

Mission of the Department

1. **To strengthen core competency of students to be successful, ethical, effective problem solver in Computer Science & Engineering through analytical learning.**
2. **To promote interdisciplinary research & innovation-based activities in emerging areas of technology globally**
3. **To facilitate and foster the industry-academia collaboration to enhance entrepreneurship skills and acquaintance with corporate culture.**
4. **To inculcate in them a higher degree of social consciousness and moral values towards solving interdisciplinary societal problems using industry-academia collaboration**

Core Values

- **Competency**
- **Global**
- **Entrepreneurship Skills**
- **Interdisciplinary research**

1.3 Programme Educational Objectives (PEO)

1.3.1 Writing Programme Educational Objectives (PEO)

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

The Program Educational Objectives (PEOs) of PG Program in Computer Science & Engineering are:

PEO-1 The graduates will establish themselves as professionals by solving real-life problems using exploratory and analytical skills acquired in the field of Computer Science and Engineering.

PEO-2 The graduates will provide sustainable solutions to ever changing interdisciplinary global problems through their Research & Innovation capabilities.

PEO-3 The graduates will become employable, successful entrepreneur as an outcome of Industry-Academia collaboration.

PEO-4 The graduates will embrace professional code of ethics while providing solution to multidisciplinary social problems in industrial, entrepreneurial and research environment to demonstrate leadership qualities

Methods of Forming PEO's

STEP 1 : The needs of the Nation and society are identified through scientific publications, industry interaction and media.

STEP 2. Taking the above into consideration, the PEOs are established by the Coordination Committee of the department.

STEP 3. The PEOs are communicated to the alumni and their suggestions are obtained.

STEP 4. The PEOs are communicated to all the faculty members of the department and their feedback is obtained.

STEP 5. The PEOs are then put to the Board of Studies of the department for final approval.

[Note: Prepare a file for the same, how you arrive for PEO's]

1.3.2 Map PEOs with Mission Statements:

DEPARTMENT PEOs / DEPT OF CSE MISSION STATEMENTS	1. The graduates will establish themselves as professionals by solving real-life problems using exploratory and analytical skills acquired in the field of Computer Science and Engineering.	2. The graduates will be able to provide sustainable solutions to ever changing interdisciplinary global problems through their Research & Innovation capabilities.	3. The graduates will become employable, successful entrepreneur and innovator as an outcome of Industry-Academia collaboration.	4. The graduates will be able to embrace professional code of ethics while providing solution to multidisciplinary social problems in industrial, entrepreneurial and research environment to demonstrate leadership qualities.	
1. To strengthen core competency of students to be successful, ethical, effective problem solver in Computer Science & Engineering through analytical learning.	3	3	2	2	10/12
2. To promote interdisciplinary research & innovation based activities in emerging areas of technology globally.	2	3	2	2	9/12
3. To facilitate and foster the industry-academia collaboration to enhance entrepreneurship skills and acquaintance with corporate culture.	2	2	3	3	10/12
4: To inculcate in them a higher degree of social consciousness and moral values towards solving interdisciplinary societal problems using industry-academia collaboration	2	2	2	3	9/12
	9/12	10/12	9/12	10/12	83%

Enter correlation levels 1, 2, or 3 as defined below:

1. Slight (Low) 2. Moderate (Medium) 3. Substantial (High)

If there is no correlation, put "-"

1.3.3 Program Outcomes (PO's)

PO1:	**Computing Knowledge:**	Ability to develop and implement optimal solutions to complex computing problems using industry-recognized best practices and standards.
PO2:	**Problem Analysis:**	Apply problem-solving and technical skills to analyze complex problems and propose feasible computing solutions using fundamental principles of mathematics and computing sciences.
PO3:	**Design/Development of Solutions:**	Design and develop the solutions to practical and complex engineering problems for welfare of society.
PO4:	**Research and Development:**	Apply research-based knowledge and methodologies to analyze the problem, interpretation of data and synthesis of the information using technical tools.
PO5:	**Modern Tool Usage:**	Create, select, and apply appropriate techniques, resources, and modern IT tools including application and modeling to computer applications with an understanding of the limitations.
PO6:	**Innovation and Entrepreneurship:**	Use innovative approach to develop opportunities to create value and wealth for the betterment of the individual and society at large.
PO7:	**Environment and Sustainability:**	Understand the impact of the professional system solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8:	**Personal and Professional Ethics:**	Apply ethical decision making in the development, implementation, and management during professional life.
PO9:	**Communication:**	Ability to communicate effectively in both manner, verbally and written, to provide integrated solution to customers/users or peers.
PO10:	**Life-Long Learning:**	Continue the process of life-long learning through professional activities; adapt themselves with ease to new technologies,
PSO1:	**Computer Science**	Use and apply current technical concepts and practices in the core areas of computer science, i.e. networking, data management, software engineering, computer security and artificial intelligence.
PSO2:	**Information Technology**	To cater to the demands of the IT and IT-enabled sectors through strong theoretical foundation with high quality teaching complemented with extensive practical training.

1.3.4 Mapping of Program Outcome Vs Program Educational Objectives

Mapping	PEO1	PEO2	PEO3	PEO4
PO1:	3	3	2	1
PO2:	3	3	3	1
PO3:	2	2	3	3
PO4:	2	3	2	2
PO5:	1	2	2	3
PO6:	1	1	2	3
PO7:	1	1	2	3
PO8:	1	1	3	2
PO9:	3	2	3	1
PO10:	2	3	1	1
PSO1:	2	3	1	3
PSO2:	3	3	2	2

1. Slight (Low) ***2. Moderate (Medium)*** ***3. Substantial (High)***

1.3.5 Program Outcome Vs Courses Mapping Table[1]:

1. Slight (Low) ***2. Moderate (Medium)*** ***3. Substantial (High)***

[1] Cel value will contain the correlation value of respective course with PO.

1.3.5.2 COURSE ARTICULATION MATRIX[2]

1-Slight (Low)
2-Moderate (Medium)
3-Substantial (High)

[2] Each course outcome (Based on Blooms Taxanomy-CO1, CO2, CO3, CO4, CO5, and CO6) of the course needs to map with PO. This table evolves once faculty has mapped each course outcomes of their respective course with PO's.

Course Outcome

- **Course Outcomes**–What is it?
  - Course outcomes (COs) are clear statements of what a student should be able to demonstrate on completion of a course.
  - COs should be assessable and measurable knowledge, skills, abilities and attitudes that student attains by the end of the course.
  - It is generally good idea to identify between 4 and 7 outcomes.
  - All courses in a particular programme shall have their own PO.
  - Each CO is mapped to relevant PO.
  - The teaching learning process and assessment process are to be designed in a way to achieve the COs.

Beginning words for Course Outcome:

Active verbs developed based on Bloom's Taxonomy

Knowledge	Understand	Apply	Analyze	Evaluate	Create
define	explain	solve	analyze	reframe	design
identify	describe	apply	compare	criticize	compose
describe	interpret	illustrate	classify	evaluate	create
label	paraphrase	modify	contrast	order	plan
list	summarize	use	distinguish	appraise	combine
name	classify	calculate	infer	judge	formulate
state	compare	change	separate	support	invent
match	differentiate	choose	explain	compare	hypothesize
recognize	discuss	demonstrate	select	decide	substitute
select	distinguish	discover	categorize	discriminate	write
examine	extend	experiment	connect	recommend	compile
locate	predict	relate	differentiate	summarize	construct
memorize	associate	show	discriminate	assess	develop
quote	contrast	sketch	divide	choose	generalize
recall	convert	complete	order	convince	integrate
reproduce	demonstrate	construct	point out	defend	modify
tabulate	estimate	dramatize	prioritize	estimate	organize
tell	express	interpret	subdivide	find errors	prepare
copy	Identify	Manipulate	survey	grade	produce
discover	indicate	Paint	advertise	measure	rearrange
duplicate	Infer	Prepare	appraise	predict	rewrite
enumerate	relate	produce	Break down	rank	role-play

(Reference: Retrieved from http://www.teachthought.com/learning/249-blooms-taxonomy-verbs-for-critical-thinking/)

School of Engineering and Technology							
Department Of Computer Science & Engineering							
M.Sc in Computer Science							
Batch: 2021 Onwards						TERM: I	
S. No.	**Course Code**	**Course**	**Teaching Load**			**Credits**	**Pre-Requisite/Co Requisite**
			L	**T**	**P**		
THEORY SUBJECTS							
1	MCT111	Database Management Systems	3	0	0	3	`
2	MCT112	Object Oriented Programming with JAVA	3	0	0	3	
3	MCT113	Information Security and Cyber Laws	3	0	0	3	
4	MCT114	Operating Systems	3	0	0	3	
5	MCT115	Computer Networks	3	0	0	3	
Practical/Viva-Voce/Jury							
6	ARP207	Logical Skills Building and Soft Skills	1	0	2	2	
7	MCL111	Database Management Systems Lab	0	0	2	1	
8	MCL112	Object Oriented Programming with JAVA Lab	0	0	2	1	
9	MCL114	Operating Systems sing Linux Lab	0	0	2	1	
9	MCL195	Project Based Learning-1	0	0	2	1	
10	MCL115	Computer Networks Lab	0	0	2	1	
						22	

School of Engineering and Technology							
Department Of Computer Science & Engineering							
M.Sc in Computer Science							
Batch: 2021 Onwards						TERM: II	
S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
			L	T	P		
THEORY SUBJECTS							
1	MCT118	Data Structure and Analysis of Algorithm	3	1	0	4	
2	MCT119	Application Programming in Python	3	0	0	3	
3		Open Elective -1	3	0	0	3	
		Management Information Systems (MIS)					
	HMM207	Management Concepts & Practices					
		Essentials of Digital Marketing					
4		Program Elective -1	3	0	0	3	
	MCT116	Artificial Intelligence					
	MCA366	Big Data Analytics					
	MCT117	Android Application Development					
5	MCT120	Research Methodology	2	0	0	2	
Practical/Viva-Voce/Jury							
8	CCU101	Community Connect	-	-	-	2	
5	ARP208	Quantitative and Qualitative Aptitude Skill Building	1	0	2	2	
6	MCL118	Data Structure and Analysis of Algorithm Lab	0	0	2	1	
7	MCL119	Application Programming in Python Lab	0	0	2	1	
3		Program Elective-1	0	0	2	1	
	MCL116	Artificial Intelligence Lab					
	MCP366	Big Data Analytics Lab					
	MCL117	Android Application Development Lab					
9	MCL196	Project Based Learning-2	0	0	2	1	
TOTAL CREDITS						**23**	

School of Engineering and Technology							
Department Of Computer Science & Engineering							
M. Sc in Computer Science							
Batch: 2021 Onwards						TERM: III	
S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
			L	T	P		
THEORY SUBJECTS							
1	MCT213	Computer Graphics and Animation	3	0	0	3	
2	MCT214	Web and its Applications	3	0	0	3	
3		Program Elective-2	3	0	0	3	
	MCT211	Data Mining & Knowledge discovery					
	MCT212	Mobile Technologies					
	MCA271	Cloud Computing					
4		Program elective-3	3	0	0	3	
	MCT216	Theory of Computation					
	MCT215	Cryptography and Network Security					
	MCA365	Software Project Management					
5	MCT216	Software Engineering & Testing	3	0	0	3	
Practical/Viva-Voce/Jury							
6	ARP305	Personality Development and Decision making Skills	1	0	2	2	
7	MCL213	Computer Graphics and Animation Lab	0	0	2	1	
8	MCL214	Web and its Applications Lab	0	0	2	1	
9	MCL354	Seminar	-	-	-	2	
10	MCL295	Project-1	-	-	-	2	
TOTAL CREDITS						23	

School of Engineering and Technology							
Department Of Computer Science & Engineering							
M.Sc in Computer Science							
Batch: 2021 Onwards						TERM: IV	
S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
			L	T	P		
THEORY SUBJECTS/ Practical/Viva-Voce/Jury							
1	MCL296	Project-2	-	-	-	12	
TOTAL CREDITS						12	

C. Course Syllabuses

TERM-I

Syllabus: MCT111 Database Management Systems

School: SET		**Batch : 2021**	
Program: M.Sc.		**Current Academic Year: 2021-2023**	
Branch: CSE		**Semester: 1**	
1	Course Code	MCT 111 | Course Name: Database Management Systems	
2	Course Title	Database Management Systems	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	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. **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. **CO6.**Design & develop database for real life problems.	
7	Course Description	This course introduces database design and creation using a DBMS product. Emphasis is on, normalization, 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 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.	
	C	Various Relational data model concepts, Unary Relational Operations	
	Unit 2	**Normalization in Design of Databases:**	
	A	Functional Dependency, Different anomalies in designing a Database, Normalization first	**CO1,**
	B	Second and Third normal forms, Boyce Codd normal form,	

	C	Multi valued dependency, fourth normal forms, Inclusion dependencies, loss less join decompositions			**CO2,CO6**
	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	DeadLock 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, multiversion schemes			
	C	Granularity of Data Items and Multiple Granularity Locking			
	Unit 5	**Recovery & Distributed System**			
	A	Failure Classification, Recovery and Atomicity, Buffer Management			**CO5**
	B	Failure with Loss of Nonvolatile Storage Recovery Algorithm			
	C	Distributed Database Concepts database, Distributed Databases Types & Architectures			
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. Korth , Silberschatz&Sudarshan, Data base 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	Program Outcomes (PO) & Program 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, PO2, PO10, PSO1
3.	**CO3:** To appraise the basic issues of Transaction processing & deadlock.	PO1, PO2, PO3, PO10, PSO1
4.	**CO4**.Identify the importance of concurrency control & Granularity and quality for data analysis.	PO1, PO2, PSO1
5	**CO5:** Explain the concept of Recovery & Distributed System.	PO1, PO10, PSO1
6	**CO6:** Design & develop database for real life problems.	PO1, PO2,PO3, PO4, PO5,PO7, PO9, PO10, PSO1,

PO and PSO mapping with level of strength for Course Name Data Base Management Systems (Course Code MCT111)

	Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCT111		Computing Knowledge	Problem Analysis	Design/Development of Solutions:	Research and Development:	Modern Tool Usage	Innovation and Entrepreneurship	Environment and Sustainability	Personal and Professional Ethics	Communication	Life-Long Learning	Computer Science	Information Technology
	CO1	3	-	-	2	-	-	-	-	-	2	2	-
	CO2	3	2	-	-	-	-	-	-	-	2	2	-
	CO3	3	2	2	-	-	-	-	-	-	2	2	-
	CO4	2	2	-	-	-	-	-	-	-	-	2	-
	CO5	2	-	-	-	-	-	-	-	-	1	2	-
	CO6	3	3	3	3	3	-	2	-	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**
MCT111 /DBMS	2.7	2.25	2.5	2.5	3	-	2	-	3	1.8	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:SET		**Batch : 2021**	
Program: MSc		**Current Academic Year: 2021-23**	
Branch:		**Semester: II**	
1	Course Code	MCT112	Course Name: Object oriented programming with JAVA
2	Course Title	Object Oriented Programming with Java	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	PG	
5	Course Objective	To learn Java language syntax and semantics and concepts such as classes, objects, inheritance , polymorphism, packages and multithreading .	
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 CO5. Explain the concept of multithreading. 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 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,	CO1,CO2

		arithmetic, logical and bitwise Operators in java,	
	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	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.	CO5,CO6
	Mode of examination	Theory	
	Weightage Distribution	CA / MTE / ETE	
		30% / 20% / 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	Program Outcomes (PO) & Program 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 MCT112)

	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
	CO1	2	2	2		2					2	1	1
	CO2	2	2								2	2	1
	CO3	2	3	3		3				3	2	3	3
	CO4	2				3					2	2	3
	CO5	1	2			1					2	1	2
	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
MCT112	Object Oriented Programming with Java	2	2	2		2.5				3	2	2	2

Strength of Correlation

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

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

2.1 Template A1: Syllabus for Theory Courses (SAMPLE)

School:		**School of Engineering and technology**		
Department		**Department of Computer Science and Engineering**		
Program:		**Msc**		
Branch:		**CS TERM:1**		
1	Course Code	MCT113		
2	Course Title	Information Security and Cyber Laws		
3	Credits	3		
4	Contact Hours (L-T-P)	3-0-0		
	Course Status	Core		
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 CyberSpace in India,		CO1,CO2. CO3
	B	Compensation and Adjudication of Violations of		CO4,CO5,CO6

		Provisions of It Act and Judicial Review, Some important Offeneces under the CyberSpace Law and the Internet in India,	
	C	Other Offences 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 CyberSpace 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, TrueBack,	CO1,CO2, CO6
	B	Hasher, EmailTracer	CO1.CO2,CO6,CO5
	C	Pasco, Nmap, BinText	CO2,CO3,CO5
	Mode of examination	Theory	
	Weightage Distribution	CA / MTE / ETE	
		30% / 20% / 50%	
	Text book/s*	1. Cyber Law and IT Protection, Chander Harish Handbook of Information Security, HosseinBidgol	
	Other References		

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program 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	PO1,PO2,PO6,PO7,PO8,PO10,

	developments in various countries to regulate Cyberspace	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 MCT113)**

Course Code_ Course Name	CO's	PO1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO2
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
MCT113	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)extent2.*** Addressed to***Moderate (Medium=2) extent***
3. Addressed to***Substantial (High=3) extent***

School: SET		**Batch : 2021**	
Program: MSc		**Current Academic Year: 2021-23**	
Branch:		**Semester: I**	
1	Course Code	MCT114 Course Name MSc	
2	Course Title	Operating System	
3	Credits	3	
4	Contact Hours(L-T-P)	3-0-0	
	Course Status	Non Elective	
5	Course Objective	1. This course introduces the challenges for designing the operating systems. 2. Includes different design principles and algorithms. 3. Evaluation of algorithms proposed. 4. Implementation of algorithms and utilities.	
6	Course Outcomes	Students will be able : **CO1:** To identify the challenges and apply suitable algorithms for them. **CO2:** To assess the strengths and weaknesses of the algorithms. **CO3:** To understand and implement algorithms in resource allocation and utilization. **CO4:** To integrate and interpret effectiveness, efficiency of algorithms used for resource management of operating systems. **CO5:** Design and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems **CO 6:** Measure, evaluate, and compare OS components through instrumentation for performance analysis	
7	Course Description	This course introduces the design principles of operating systems, resource management, identifying challenges and applying respective algorithms.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Operating System Concepts and functions, Comparison of different Operating system	CO1, CO2
	B	Types of Operating Systems (Batch, Multiprogramming ,Multi Tasking , Multiprocessing, Distributed and Real Time Operating System)	CO1, CO2
	C	Operating System Structure, Operating System Services	CO1, CO2
	Unit 2	**Process Synchronization**	
	A	Process Concepts (PCB, Process States , Process Operations, Inter process communication)	CO1, CO2,CO3
	B	Critical Section problem & their solutions, Introduction to Semaphores,	CO1, CO2,CO3
	C	Classical Problems of Synchronization (Producer Consumer Problem, Readers Writer Problem, Dining	CO1, CO2,CO3,CO4

		philosophers problem), Implementation of synchronization algorithms.	
	Unit 3	**CPU Scheduling**	
	A	Concept , Types of schedulers(Short term, Long term, Middle term), Dispatcher, Performance Criteria	CO1,CO2
	B	CPU Scheduling Algorithms(FCFS, SJF, Priority, Round Robin, Multilevel Queue, Multilevel feedback Queue)	CO1,CO2,CO3,CO4, CO5, CO6
	C	Deadlock concepts & Handling Techniques(Avoidance, Prevention and Detection & Recovery)	CO1,CO2,CO3,CO4, CO6
	Unit 4	**Memory Management**	
	A	Memory Hierarchy, Memory Management Unit	CO1,CO2,CO3
	B	Paging, Segmentation	CO1,CO2,CO3
	C	Virtual memory concept, demand paging, Page replacement algorithms(FCFS, Optimal, LRU), Associative memory	CO1,CO2,CO3
	Unit 5	**Disk and File Management**	
	A	File Concept ,File operations, File Directories, Case study of Windows Operating System	CO1,CO2,CO3, CO5
	B	Disk structure , Disk scheduling(FCFS,SSTF, SCAN, LOOK,C-SCAN, C-LOOK)	CO1,CO2,CO3,CO4
	C	Case study: UNIX, Commands related to Process and File Handling	CO1,CO2,CO3, CO5, CO6
	Mode of examination	Theory	
	Weightage Distribution	CA / MTE / ETE	
		30% / 20% / 50%	
	Text book/s*	1. Silberschatz G, *Operating System Concepts*, Wiley	
	Other References	1. W. Stalling, "Operating System", Maxwell Macmillan 2. Tannenbaum A S, *Operating System Design and Implementation*, Prentice Hall India 3. Milenkovic M, *Operating System Concepts*, McGraw Hill	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:** To identify the challenges and apply suitable algorithms for them.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:** To assess the strengths and weaknesses of the algorithms.	PO1, PO3, PO4, PSO2
3.	**CO3:** To understand and implement algorithms in resource allocation and utilization.	PO1,PO2,PO3,PO4
4.	**CO4:** To integrate and interpret effectiveness, efficiency of algorithms used for resource management of operating systems.	PO9, PO10, PSO2

5.	**CO5:** Design and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems	PO1,PO2,PO3,PO4, PO9, PO10, PSO2
6.	**CO 6:** Measure, evaluate, and compare OS components through instrumentation for performance analysis	PO1,PO2,PO3,PO4, PO9, PO10, PSO2

PO and PSO mapping with level of strength for Course Name Operating System (Course Code MCT 114)

	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CSE	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	3	3	3	--	--	--	1	1	1	3	2
	CO 6	2	2	2	2	1	--	--	2	3	3	2	2

Computer Networks

School: SET		**Batch :2021**	
Program: M.Sc.		**Current Academic Year: 2021-23**	
Branch: CS & IT		**Semester:1**	
1	Course Code	MCT115 | Course Name: **Computer Networks**	
2	Course Title	**Computer Networks**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	Provide students with an overview of networking, insight into the issues, challenges and working at all level of reference models. Also practice on applying protocols in network design.	
6	Course Outcomes	Students will be able to: **CO1:**Demonstrate and differentiate working of all layers of the OSI Reference Model and TCP/IP model. **CO2:**Investigate and explore fundamental issues driving network design including error control. **CO3:** Understand and building the skills of IP addressing, subnetting and routing protocols. **CO4:** Discuss the flow control, elements and protocols of transport layer **CO5:** Describe the connection management and application layer protocols. **CO6:** Outline the basic knowledge of the use of cryptography and network security.	
7	Course Description	To familiarize with the basic taxonomy and terminology of computer networking area.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Introduction to computer networks, applications and uses, classification of Networks based on topologies, geographical distribution and communication techniques	CO1, CO2
	B	**Reference models:** OSI model, TCP/IP model , Overview of Connecting devices (Hub, Repeaters, Switches, Bridges, Routers, Gateways)	CO1, CO2
	C	**Transmission Media:** wired , wireless, Multiplexing techniques- FDM, TDM	CO1, CO2
	Unit 2	**Data Link Layer**	
	A	Functions, Framing, Error Control-Error correction codes(Hamming code),Error Detection codes(Parity Bit, CRC)	CO1, CO2
	B	Flow Control- Stop and Wait Protocol, Sliding window –Goback N and Selective repeat(ARQ)	CO1, CO2
	C	MAC- Sub-layer Protocols: ALOHA, CSMA, CSMA/CD	CO1, CO2

		protocols, IEEE Standards 802.3, 802.4,802.5	
	Unit 3	**Network Layer**	
	A	Design issues , IPV4addressing basics and Header format, CIDR, sub-netting and sub-masking	CO1,CO3
	B	Routing, optimality Principle Routing protocols-, Shortest path, flooding, distance vector routing , link state routing	CO1,CO3
	C	Congestion control-Leaky bucket , Token Bucket, jitter control	CO1,CO3,CO4
	Unit 4	**Transport Layer**	
	A	Need of transport layer with its services, Quality of service, connection oriented and connection less	CO1,CO4
	B	Transmission Control Protocol: Segment structure and header format, TCP Connection Management, Flow Control	CO1,CO4,CO5
	C	TCP congestion control, Internet Congestion Control Algorithm, Overview of User Datagram Protocol (UDP)	CO1,CO4,CO5
	Unit 5	**Application Layer**	
	A	Domain Name System (DNS), HTTP, FTP, SMTP	CO1,CO5
	B	Network Security services, cryptography, Symmetric versus Asymmetric cryptographic algorithms- DES, and RSA	CO1,CO5,CO6
	C	Application of Security in Networks: Digital signature	CO1,CO5,CO6
	Mode of examination	Theory	
	Weightage Distribution	CA / MTE / ETE 30% / 20% / 50%	
	Text book/s*	1. Tanenbaum, A.S." Computer Networks", 4th Edition, PHI	
	Other References	1. Forouzan, B.., "Communication Networks", TMH, Latest Edition 2. W. Stallings, "Data and Computer Communication" Macmillan Press	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:**Demonstrate and differentiate working of all layers of the OSI Reference Model and TCP/IP model.	PO2,PO11,PO12,PSO2
2.	**CO2:**Investigate and explore fundamental issues driving network design including error control.	PO1,PO3,PO4,PO5,PO11PO12,PSO 2
3.	**CO3:** Understand and building the skills of IP addressing, subnetting and routing protocols.	PO1,PO2,PO4,PO6,PSO1
4.	**CO4:** Discuss the flow control, elements and protocols of transport layer	PO2,PO3,PSO2
5.	**CO5:** Describe the connection management and application layer protocols.	PO1, PO2,PO3, PO4, PSO2
6.	**CO6:** Outline the basic knowledge of the use of cryptography and network security.	PO1, PO2, PO4,PO8, PSO2

PO and PSO mapping with level of strength for Course Name Computer Networks (Course Code MCT115)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1		2	-	-	-	-	-	-	-	-	2	2
CO2	2	-	2	2	3	-	-	-	-	-	2	2
CO3	3	2	-	2	-	2	-	-	-	-	2	2
CO4	-	2	2	-	-	-	-	-	-	-	2	2
CO5	2	2	2	2	-	-	-	-	-	-	2	2
CO6	2	-	-	2	-	-	-	2	-	-	2	2
Avg.	1.5	1.33	1	1.33	0.5	0.33	-	0.33	-	-	2	2

School: SET		**Batch :** 2021-2022	
Program:		**Academic Year:** 2021-2022	
Branch: CSE		**Semester:** III	
1	Course Code	**ARP207**	Course Name : **Logical Skills Building and Soft Skills**
2	Course Title	**Logical Skills 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 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	Outline syllabus – ARP 207		
	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) | Verbal Abilities - 1	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
	Weightage Distribution	*Class Assignment/Free Speech Exercises / JAM – 60% | Group Presentations/Mock Interviews/GD/ Reasoning, Quant & Aptitude – 40%*	
	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	PO11	PO12	PSO1	PSO2	PSO3
ARP207.1	-	-	-	-	1	-	-	-	1	3	-	2	-	-	-
ARP207.2	-	-	-	-	1	-	-	-	1	3	-	2	-	-	-
ARP207.3	-	-	-	-	1	-	-	-	1	3	-	2	-	-	-
ARP207.4	-	-	-	-	-	-	-	-	1	2	1	2	-	-	-
ARP207.5	1	-	-	-	-	-	-	-	1	2	1	2	-	-	-
ARP207.6	1	-	-	-	-	-	-	-	1	2	1	2	-	-	-

Syllabus: MCL111 Database Management Systems Lab

School: SET		**Batch: 2021-2023**	
Program: M.Sc.		**Current Academic Year: 2021-2022**	
Branch: CSE		**Semester: 1**	
1	Course Code	MCL 111	
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 & Cursers**			CO4
		Program related with Trigger & Cursors			
	Unit 5	**Procedures & Functions**			CO5, CO6
		Applying Procedures & Functions			
		Develop Real life Applications			
Value Added Practicals: Applications such as Banking ,Library,Pay roll, University etc..					
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Korth , Silberschatz& Sudarshan, Data base 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	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:** Understand the concept of SQL commands in DBMS.	PO2, PO10, PSO1,
2.	**CO2** Create & Perform operations using DDL , DML& Grouping Clauses .	PO2, PO3, PO5, PO9,PO10, PSO1
3.	CO3: Manipulate your data using Sub-queries & Joins.	PO1, PO2, PO3, PO5, PO9,PO10, PSO1
4.	CO4: Implementation of Trigger & Cursors	PO1, PO5,PO10, PSO1
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 (Course Code MCL111)

	Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCL 203		Computing Knowledge	Problem Analysis	Design/Development of Solutions:	Research and Development:	Modern Tool Usage	Innovation and Entrepreneurship	Environment and Sustainability	Personal and Professional Ethics	Communication	Life-Long Learning	Computer Science	Information Technology
	CO1	-	-	-	2	-	-	-	-	-	2	2	-
	CO2	-	2	2	-	2	-	-	-	2	2	2	-
	CO3	3	2	2	-	2	-	-	-	2	2	2	-
	CO4	2	-	-	-	2	-	-	-	-	2	2	-
	CO5	2	2	-	-	-	-	-	-	-	1	-	2
	CO6	3	3	3	3	3	-	2	-	3	2	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**	**PO10**	**PSO 1**	**PSO 2**
MCL111 /DBMS	2.5	2.25	2.3	2.5	2.25	-	2	-	2.3	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***

School:		**School of Engineering and technology**	
Department		**Department of Computer Science and Engineering**	
Program:		**Master of Science**	
Branch:		CS	
1	Course Code	MCL112	
2	Course Title	Introduction to OOP 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: Setting 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, setting path,Installation and uses of IDE, Writing Java programs, program execution,JVM, JVM for other operating systems, .class files, running byte code in different platforms	CO1
	Unit 2	**Programming revisited**	
		Programs on different datatypes, promotion rules in expressions, narrowing & type casting, logical-bit wise-arithmetic operators,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 in Java, nested control structures	CO2,CO3
	Unit 3	**class , object and constructor**	
		Programs to define classes, defining data members &	CO2,CO3

		member function, create objects, accessing members of a class through objects, Programs to define constructors, initializing instance variables, method overloading, constructor overloading,Programs to use static members, accessing static members, string handling methods	
	Unit 4	**Inheritance, package and Interface**	
		Programs on different types of inheritance, using super, constructor chaining, method overriding,Programs to use final variables, methods and classes, creat abstract classe, achieving multiple inheritance through interfaces, inheritance in interfaces, Programs to create packages, import packages, role of access modifiers in default, private, protected and public mode	CO3,CO4,CO6
	Unit 5	**I/O, Exception and Multithreading**	
		Programs to use try.. catch.. finally for exception handling, throw user defined exceptions, uses of throws, nested try catch, rethrowing exceptions, Programs to use Stream class to read and write in a File, Programs to define, run and synchronize multiple threads by extending Thread class and implementing Runnable interface.	CO3,CO5,CO6
	Mode of examination	Jury/Practical/Viva	
	Weightage Distribution	CA / MTE / ETE	
		60% / 0% / 40%	
	Text book/s*	1.Schildt H, "The Complete Reference JAVA2", TMH	
	Other References	3. 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 (Course Code MCL112)

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	PO 11	PO 12	PSO 1	PSO2	PSO3
MCL112_ Introduction to OOP using Java Lab	CO1	1			2	2					2			2	3	
	CO2	2			2	2					2			3	2	
	CO3	2	3	3	3	2					2			2	3	
	CO4	3			3	2					2			2	3	
	CO5	3			3	2					2			3	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
MCL112	Introduction to OOP using Java Lab	2.3	3	3	2.5	3					2	2.5	2.5

Strength of Correlation

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

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

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	Write a Java program to accept a number and check the number is even or not. Prints 1 if the number is even or 0 if the number is odd.
	2.2	Write a Java program that accepts three integers from the user and return true if the second number is greater than first number and third number is greater than second number. If "abc" is true second number does not need to be greater than first number.
3	3.1	Write a Java program to find the maximum occurring character in a string
	3.2	Write a Java program to find first non repeating character in a string.
	3.3	Write a program in java to demonstrate method overloading
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	Write a program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.
	5.2	Write a java program that implements a multi-thread application that has three threads. First hread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number

Syllabus: MCL114, OPERATING SYSTEMS SING LINUX LAB

School: SET		**Batch: 2021-2023**	
Program: MSc		**Current Academic Year: 2021**	
Branch:CS		**Semester: 1**	
1	Course Code	MCL 114	
2	Course Title	Operating Systems sing Linux Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	• This course introduces the challenges for designing the operating systems. • Includes different design principles and algorithms. • Evaluation of algorithms proposed. • Implementation of algorithms and utilities.	
6	Course Outcomes	By the end of this course you will be able to: CO1: Understanding the structure of different operating systems & System Calls. CO2: Applying CPU Scheduling Algorithms & Various Memory Management Schemes. CO3: Applying Various Deadlock Detection &Avoidance Techniques. CO4: Implementing Various Classical Concurrency & Synchronization techniques. CO 5: Implement the memory based allocation CO 6:-Apply page replacement algorithm	
7	Course Description	This course introduces the design principles of operating systems, resource management, identifying challenges and applying respective algorithms.	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based operating systems.**	**CO1**
		P1. Write programs using the following system calls of LINUX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir. **P2.** Write programs using the I/O system calls of LINUX operating system (open, read, write, etc) **P3.** Write C programs to simulate LINUX commands like ls, grep, etc.	
	Unit 2	**Practical based on System Calls.**	**CO1**
		P4. Write a program to create processes and threads. **P5.** Write a program solving the Producer-Consumer problem using semaphores.	

		P6. Write a program to implement the solution for dining philosopher's problem.	
	Unit 3	**Practical based scheduling.**	**CO2**
		P7. Write a program to develop an application using I process communication using shared Memory. **P8.** Write a program to implement process scheduling mechanisms using FCFS & SJF. **P9.** Write a program to implement process scheduling mechanisms using Priority & round-robin scheduling.	
	Unit 4	**Practical based on Memory Allocation.**	**CO2, CO3, CO5**
		P10. Write a program to implement the banker's algorithm. **P11.** Write a program to implement memory allocation using first fit algorithm. **P12.** Write a program to implement memory allocation using best fit algorithm. **P13.** Write a program to implement memory allocation using worst fit algorithm.	
	Unit 5	**Practical based on Page replacement.**	**CO4, CO6**
		P14. Write a program to implement the page replacement algorithms.	
	Mode of examination	Jury/Practical/Viva	
	Weightage Distribution	CA: 60% / MTE: 0% / ETE: 40%	
	Text book/s*	1. Silberschatz G, *Operating System Concepts*, Wiley	
	Other References	4. W. Stalling, "Operating System", Maxwell Macmillan 5. Tannenbaum A S, *Operating System Design and Implementation*, Prentice Hall India.	

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:** Understand the concept of SQL commands in DBMS.	PO1,PO2,PO3,PO10
2.	**CO2:** Create SQL SELECT statements that retrieve any required data.	PO1, PO2, PO3, PS5,PO9,PO10,PSO1,PSO2
3.	**CO3:** Perform operations using Data Manipulation Language statements like Insert, Update and Delete.	PO1,PO2,PO3,PO5,PO9,PO10,PSO1,PSO2
4.	**CO4:** Manipulate your data to modify and summaries your results for reporting.	PO1, PO2,PO3, PO4,PO5,PO9,PO10,PSO1,PSO2
5.	CO 5: Implement the memory based allocation	PO1, PO2,PO3, PO4,PO5,PO9,PO10,PSO1,PSO2
6.	CO 6:-Apply page replacement algorithm	PO1, PO2,PO3, PO4,PO5,PO9,PO10,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Operating Systems sing Linux Lab (Course Code MCL 114)

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

1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

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School: SET		**Batch : 2021 – 2023**			
Program: MSc		**Current Academic Year: 2021-2022**			
Branch: CS		**Semester: 1stSem**			
1	Course Code	**MCL195** Course Name: Project based learning-1			
2	Course Title	Project based learning-1			
3	Credits	1			
4	Contact Hours (L-T-P)	0-0-2			
	Course Status	Compulsory			
5	Course Objective	1.To align student's skill and interests with a realistic problem or project 2.To understand the significance of problem and its scope 3.Students will make decisions within a framework			
6	Course Outcomes	Students will able to: CO1: Identify problem statement with systematic approach; define its requirements and specifications appropriate to its solution. CO2: Apply prior knowledge to designing and implementing solutions to problems using advanced programming techniques. CO3: Analyze and make use of modern tools and packages in efficient manner./ reuse- or integrate with- existing components CO4: Apply techniques of software verification and validation of project successfully. CO5: Deduce and conclude effective time and project management techniques. CO6: Effectively elaborate and communicate the project work in written and oral forms using appropriate different visualization tools and evaluation metrics, preferably research paper.			
7	Course Description	This course will consist of the work on the topic selected for the project based learning .The project must be done in a group not exceeding three students. The candidate is expected to select the project, do the requirements analysis, and carry out the necessary design procedure.			
	Weight-age Distribution	CA	MTE	ETE	
		60%	NA	40%	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO)
1.	CO1: Identify problem statement with systematic approach; define its requirements and specifications appropriate to its solution.	**PO1,PO2,PO4,PO10,PSO1,PSO2**
2.	CO2: Apply prior knowledge to designing and implementing solutions to problems using advanced programming techniques.	**PO1, PO3,PO4,PSO1,**
3.	CO3: Analyze and make use of modern tools and packages in efficient manner./ reuse- or integrate with- existing components	**PO5, PO2, PO4,PO7,PSO1**
4.	CO4: Apply techniques of software verification and validation of project successfully.	**PO3,PO8**
5.	CO5: Deduce and conclude effective time and project	**PO3,PO8**

	management techniques.	
6.	CO6: Effectively elaborate and communicate the project work in written and oral forms using appropriate different visualization tools and evaluation metrics, preferably research paper.	**PO9,PSO1, PSO2**

PO and PSO mapping with level of strength for Course Name: PBL-1(MSc)-MCL195

COs	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO 10	PSO 1	PSO2
CO1	3	3	-	2	-	-	-	-	-	2	3	2
CO2	3	-	2	2	-	-	-	-	-	-	3	-
CO3	-	2	-	2	2	-	2	-	-	-	2	-
CO4	-	-	3	-	-	-	-	3	-	-	-	-
CO5	-	-	3	-	-	-	-	3	-	-	-	-
CO6	-	-	-	2	-	-	-	-	3	-	3	3

School:		School of Engineering and technology	
Department		Department of Computer Science and Engineering	
Program:		M.Sc.	
Branch:		CS Term: 1	
1	Course Code	MCL115	
2	Course Title	Computer Networks Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory/Elective	
5	Course Objective	To Provide students with an overview of networking and Gain insight into the issues, challenges and work at all level of reference models	
6	Course Outcomes	Students will be able to: CO1: Explain the basic concepts of computer network. CO2: Illustrate and differentiate working of all layers of the OSI Reference Model and TCP/IP model CO3: Analyze fundamental issues driving network design including error control, IP addressing, access control, flow and congestion control CO4: Compare working of various routing algorithms CO5: Test various network security algorithms CO6: Examine various cryptographic Algorithms	
7	Course Description	To familiarize with the basic taxonomy and terminology of computer networking area.	
8	Outline syllabus		CO Mapping
	Unit 1	Introduction	
	A	Study of Data Communication and Networking. Identify five components of Data communication system.	CO1, CO2
	B	Study of computer network topology and OSI model layered architecture.	CO1, CO2
	C	Study of basic networking commands: IPCONFIG, PING / Tracer and Net stat utilities to debug the network issues.	CO1, CO2
	Unit 2	Data Link Layer	
	A	To connect the computers in Local Area Network	CO1, CO2
	B	Write a C program to implement Character Stuffing and Destuffing	CO1, CO2

	C	Write a C program to Error Detection using Cyclic Redundancy Check Algorithms.			CO1, CO2
	Unit 3	Network Layer			
	A	Write a C program to determine if the IP address is in Class A, B, C, D, or E.			CO1,CO3
	B	Write a C program to translate dotted decimal IP address into 32-bit address.			CO1,CO3
	Unit 4	Transport Layer			
	A	Write a program for congestion control using Leaky bucket algorithm.			CO1,CO4
	B	Write a program for congestion control using Token bucket algorithm.			CO1,CO4,CO5
	C	Creating a Network topology using CISCO packet tracer software			CO1,CO4,CO5
	Unit 5	Application Layer			
	A	Write a program to implement DES for encryption.			CO1,CO5
	B	Write a Program to implement RSA			CO1,CO5,CO6
	C	Open Ended Project			CO1,CO5,CO6
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	Tanenbaum, A.S.” Computer Networks”, 4th Edition, PHI			
	Other References	3. Forouzan, B.., “Communication Networks”, TMH, Latest Edition 4. W. Stallings, “Data and Computer Communication” Macmillan Press			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Explain the basic concepts of computer network.	PO1, PO2, PO3, PO10, PSO1, PSO2
2.	CO2: Illustrate and differentiate working of all layers of the OSI Reference Model and TCP/IP model	PO1,PO2, PO4,PO6,PO10,PSO2
3.	CO3: Analyze fundamental issues driving network design including error control, IP addressing, access control, flow and congestion control	PO1,PO2,PO3,PO5,PO8,PO10,PSO1,PSO2
4.	CO4: Compare working of various routing algorithms	PO1,PO2, PO4, PO7,PO9,PO10,PSO2
5.	CO5: Test various network security algorithms	PO1,PO2,PO3,PO5,PO6,PO8,PO10, PSO1,PSO2
6.	CO6: Examine various cryptographic Algorithms	PO1,PO2, PO4,PO7, PO9,PO10,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Computer Networks Lab (Course Code MCL115)

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
Computer Networks Lab (Course Code MCL115)	CO1	2	2	2							3	3	3
	CO2	3	3		3		2				3		2
	CO3	2	3	3		3			3		3	2	3
	CO4	3	3		3			3		2	3		3
	CO5	3	2	2		3	3		3		3	2	2
	CO6	3	3		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
MCL115	Computer Networks Lab	2.6	2.6	1.1	1.6	1	.8	1	1	.8	3	1.6	2.5

Strength of Correlation

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

TERM-II

School:		**School of Engineering and technology**		
Department		**Department of Computer Science and Engineering**		
Program:		**M.Sc**		
Branch:		**CS**		
1	Course Code	MCT118		
2	Course Title	Data Structure and Analysis of Algorithm		
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 understanding about 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 analyze time and space complexity		
6	Course Outcomes	CO1: **Analyze** algorithms and algorithm 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: **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**		
	A	Data Structure – Definition, Operations, Abstract Data Types, Algorithm – Definition, Complexity and Asymptotic notations, Time and Space tradeoffs.		**CO1, CO2**
	B	Arrays: Definition and Address Calculation, Linear Search, Recursion – Definition, Examples- Tower of Hanoi problem, Fibonacci Series		**CO1**
	C	Divide-and-conquer: Analysis and Structure of divide-and-conquer algorithms, Divide-and-conquer examples- Binary search, Quick sort, Merge sort, Recurrence solving methods		**CO1, CO2**

	Unit 2	**Stack , Queue and Linked List**	
	A	Concept of Linked List, Garbage Collection, Overflow and Underflow, Array Implementation and Dynamic Implementation of Singly Linked Lists	**CO2, CO3 CO6**
	B	Stacks: Definitions, Primitive operations, Application of stacks – Conversion of Infix Expression to Postfix form, Evaluation of Postfix Expressions	**CO3, CO6**
	C	Queues: Definition, Primitive Operations, Implementation of Circular Queues, Priority Queues, Dequeue	**CO1, CO3, CO6**
	Unit 3	**Tree and Graphs**	
	A	Trees: Terminologies, Binary tree, Representation, Binary Search Trees, B Trees - Operations on a B Tree, AVL Tree	**CO2, CO3, CO6**
	B	Red-Black Trees - Definition, Applications, Insertion and deletion of elements in RB-Tree	**CO1, CO3, CO6**
	C	Graph: Terminology, Representation, Traversals- Depth First Search, Breadth First Search, Graph Applications – Minimum Spanning Trees – Prim's and Kruskal's Algorithms, Shortest Path – Dijkstra's	**CO3, CO6**
	Unit 4	**Greedy and Dynamic Approach**	
	A	Overview of Greedy and applications, Fractional Knapsack problem, Task Scheduling	**CO1, CO4, CO6**
	B	Overview, Difference between dynamic programming and divide and conquer, Applications and analysis: Matrix Chain Multiplication	**CO4, CO6**
	C	Applications and analysis: 0/1 Knapsack Problem, Longest Common sub-sequence	**CO4, CO6**
	Unit 5	**Selected Topics**	
	A	String Matching Algorithms – Naive String Matching Algorithm, Rabin Karp Algorithm	**CO2, CO5**
	B	Overview and analysis of Backtracking & Branch and Bound: N-Queens problem and Sum of subsets	**CO2, CO5**
	C	Introduction to NP Complete and NP Hard Problems	**CO2, CO5**
	Mode of examination	Theory/Jury/Practical/Viva	
	Weightage Distribution	CA: 30% / MTE: 20% / ETE: 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	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**Analyze** algorithms and algorithm 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.	**Analyze** 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 Structure and Analysis of Algorithm **(**MCT118**)**

Course Code_ Course Name	**COs**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PSO 1**	**PSO 2**
MCT118_Data Structure and Analysis of Algorithm	**CO 1**	3	1	3	-	-	2		2	1	2	1	2
	CO 2	3	3	2	1	1	-				2	3	1
	CO 3	2	1	2	2	2	-				3	3	2
	CO 4	1	2	2		2	-				3	2	1

	CO 5	2	1	3			1			2	3	1	3
	CO 6	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
MCT118	Data Structure and Analysis of Algorithm	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)extent2.*** Addressed to***Moderate (Medium=2) extent***
3. Addressed to***Substantial (High=3) extent***

Syllabus for Application Programming in Python MCT119

School:		**School of Engineering and technology**	
Department		**Department of Computer Science and Engineering**	
Program:		**MSc**	
Branch:		**CS**	
1	Course Code	**MCT119**	
2	Course Title	**Application Programming in Python**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	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 the concept of decision, repetition structures and various data types. CO2. Formulate methods and functions to improve readability of programs. CO3. Construct a logical solution by using object-oriented programming methodology CO4.Develop a module for Email processing using SMTP. CO5. Build application based python program to interact with data base. CO6. Design logical solution to solve real life problems using Python concept.	
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	**Introduction**	
	A	**Introduction:** History, Python architecture, Variables, Data Types, Operators.**Conditional Statements:** If, If-else, Nested if-else. **Looping:** For,While, Nested loops **Control Statements:** Break, Continue, Pass	CO1,CO3
	B	**Lists:**Introduction, Accessing list, Operations, Working with lists, Functionand Methods with Lists	CO1,CO3
	C	**Tuple:**Introduction, Accessing tuples, Operations, Working, Functions and Methods with Tuples	CO1,CO3
	Unit 2	**Dictionary, Functions and Exceptions**	
	A	**Dictionaries :**Introduction, Accessing values in dictionaries, Working with dictionaries,Functions	CO2,CO3

	B	**Functions:**Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables	CO2,CO3
	C	**Exception Handling**: Definition Exception, Exception handling ,Except clause, Try ? finally clause, User Defined Exceptions	CO2,CO3
	Unit 3	**Object oriented programming**	
	A	.**OOPs concept** : Class and object, Attributes, Inheritance	C04
	B	Overloading, Overriding, Data hiding	CO4
	C	**Python File Operation:** Opening, Closing, Reading, Writing operation into files. Manipulating File Pointer	CO4
	Unit 4	**Modules, Email Processing**	
	A	**Modules:** Importing module, Math module, Random module, Matplotlib, Packages	CO4
	B	**Contacting User Through Emails Using Python:** Installing SMTP python module, Sending email, .	C04
	C	Reading from file and sending emails to all users addressing them directly for marketing	CO4
	Unit 5	**Database Handling**	
	A	**Python Database Interaction**: SQL Database connection using python, Creating and searching tables, ,	CO5,CO6
	B	Reading and storing config information on database	CO5,CO6
	C	Programming using database connections	CO5,CO6
	Mode of examination	Theory/Jury/Practical/Viva	
	Weightage Distribution	CA: 30% / MTE: 20% / ETE: 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 Balahurusamy, McGrwHill 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	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1. Apply the concept of decision, repetition structures and various data types.	PO1, PO2,PO3,PO4, PO7,PO10,PSO1,PSO2
2.	CO2. Formulate methods and functions to improve readability of programs.	PO1,PO2, PO3,PO4, PO7,PO10 PSO1,PSO2
3.	CO3. Construct a logical solution by using object-oriented programming	PO1, PO2,PO3,PO4, PO7,PO10,PSO1,PSO2
4.	CO4.Develop a module for Email processing using SMTP.	PO1,PO2,PO3,PO4,PO5, PO7,PO10, PSO1, PSO2
5.	CO5. Build application based python program to interact with data base.	PO1, PO2,PO3,PO4,PO5, PO7,PO10,PSO1,PSO2
6.	CO6. Design logical solution to solve real life problems using Python concept.	PO1, PO2,PO3,PO4,PO5, PO7,PO10, ,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name: Application Programming in Python (Course CodeMCT119)

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
Application Programming in Python	CO1	2	1	1	1	-	-	2		-	1	2	2
	CO2	2	2	2	1	-	-	2	-	-	1	2	2
	CO3	2	2	2	1	-	-	2	-	-	1	2	2
	CO4	2	1	2	3	2	-	2	-	-	1	1	2
	CO5	2	2	2	1	2	-	2	-	-	1	3	3
	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
MCT119	**Application Programming in Python**	2.1	1.8	2	1.5	1		2			1	2.1	2.3

Strength of Correlation

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

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

HMM207: MANAGEMENT CONCEPTS & PRACTICES

1	Course number	HMM 207	
2	Course Title	MANAGEMENT CONCEPTS &PRACTICES	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
5	Course Objective	This course provides a systematic coverage of Management Theories, tools, techniques, processes, Management Roles and Functions. It shall provide a strong foundation with conceptual clarity of the principles of Management as well as its significance for an Organization.	
6	Course Outcomes	1. To be able to understand basic concepts of management and its process towards achieving organization's goal. 2. To understand the concept of organization structure, design, functions and practices. 3. To be able to contribute in organizational culture ethics and value and describe the elements to manage organizational culture. 4. To justify the concept of coordination and managerial roles and management levels of and to assess the significance of the concept of motivation, which attempt to explain the causes of human behavior. 5. To understand the importance of the study of the discipline of Management Theory and Practices. 6. To understand the new roles emerging in organizations as a result of innovations in technology. 7. To evaluate the conditions under which teams are preferred over individuals and to list the strengths, weaknesses, threat and opportunities of organization. 8. To understand the concept of planning and highlight the application of motivational theories through management by objectives. 9. To contrast between leadership and management and to examine the relationship that activities have with successful and effective leaders. 10. To rate the reasons why employees as well as the organization resist change and how this change could be introduced in the organizations. 11. To outline the conflict process and to understand various styles of managing conflict and to explore causes and remedies for Stress. 12. To estimate the importance of Training and Organizational Development and its various intervention strategies.	
7	Outline Syllabus: Management Concepts and Practices		
7.01	HMM207.A	Unit A	
7.02	HMM207.A1	Unit A Topic 1	Concept of management & management process, efficiency and effectiveness, Is managing a science or art?
7.03	HMM207.A2	Unit A Topic 2	Management Levels, Managerial roles (Mintzberg) and functions; Concept of co-ordination and its importance to management

7.04	HMM207.A3	Unit A Topic 3	Organizational environment, ethics in managing and social responsibility of managers
7.05	HMM207.B	Unit B	
7.06	HMM207B1	Unit B Topic 1	Development of Management Thought, Scientific Management Theories(Frederick Taylor), Administrative Management Theory(Max Weber, Henry Fayol, Mary Parker Follett) Behavioural Management Theory(Hawthorne Studies, Maslow),
7.07	HMM207.B2	Unit B Topic 2	Michael Porter's competitive strategy
7.08	HMM207.B3	Unit B Topic 3	Value chain analysis.
7.09	HMM207.C	Unit C	
7.10	HMM207.C1	Unit C Topic 1	Planning & Goal setting, Types of Plan, Planning-Levels, Purpose, Process, concept of MBO, Barriers to effective planning, SWOT analysis, McKinsey's 7's approach.
7.11	HMM207.C2	Unit C Topic 2	Organizing- Process,Organization Designs- functional, Matrix, authority and responsibility,
7.12	HMM207.C3	Unit C Topic 3	Centralization and decentralization, concept of departmentalization, Effective Organizing practices.
7.13	HMM207.D	Unit D	
7.14	HMM207.D1	Unit D Topic 1	Direction- Concept of direction – nature and scope of directing, Motivation- concept and importance,, Theories of motivation- Herzberg's Motivation-Hygiene Theory, McClelland's Need Theory, Maslow's Hierarchy, McGregor's X & Y, Situational approach: Managerial Grid
7.15	HMM207.D2	Unit D Topic 2	Leadership – Models, Leadership behaviour & styles-Autocratic, democratic, Transformational, free-rein leadership, Trait theory of leaders
7.16	HMM.207.D3	Unit D Topic 3	Control- Concept, process, Relationship between Planning & Control, Types of Control, Dimensions of Control.
7.17	HMM207.E	Unit E	
7.18	HMM207.E1	Unit E Topic 1	Managing Change & Conflict, Training & development for Managerial and non-managerial staff.
7.19	HMM207.E2	Unit E Topic 2	Management practices: TQM, KAIZEN, 5 S Technique, JIT,
7.20	HMM207.E3	Unit E Topic 3	SIX SIGMA, BALANCED SCORE CARD, Bench Marking
8	Course Evaluation		
8.1	Course work: 30		
8.11	Attendance	None	
8.12	Homework	Three best out of 4 assignments : 20 marks	
8.13	Quizzes	Two 30 minute surprise quizzes : 10 marks	
8.14	Projects	None	
8.15	Presentations	None	
8.16	Any other	None	
8.2	MTE	One, 20%	
8.3	End-term examination: 50%		
9	References		
9.1	Text book	Gupta, C.B., Management Theory & Practice,Sultan Chand & Sons, New Delhi	
9.2	other	1. Prasad, L.M., Principles and Practice of Management, Sultan Chand & Sons,	

	references	New Delhi 2. Weihrich and Koont, Essentials of Management, Tata McGraw Hill, New Delhi 3. Burton&Thakur, Management Today:Principles & Practice, , Tata McGraw Hill, New Delhi 4. Prem Vrat, Ahuja, & Jain, Case Studies in Management, Vikas Publishing House, 2006

Mapping of Outcomes vs. Topics

File Name : Management Concepts and Practices

Outcome no. → Syllabus topic↓	1	2	3	4	5	6	7	8	9	10	11	12
HMM207.A	X											
HMM207.A1		X										
HMM207.A2			X									
HMM207.A3			X									
HMM207.B				X								
HMM207.B1				X	X							
HMM207.B2					X							
HMM207.B3						X						
HMM207.C						X	X					
HMM207.C1							X					
HMM207.C2								X				
HMM207.C3								X				
HMM207.D								X				
HMM207.D1								X	X			
HMM207.D2									X			
HMM207.D3										X		
HMM207.E										X		
HMM207.E1											X	
HMM207.E2											X	
HMM207.E3												X

Essentials of Digital Marketing

School:		**School of Engineering and technology**		
Department		**Department of Computer Science and Engineering**		
Program:		**MSc**		
Branch:		**CS**		
1	Course Code			
2	Course Title	**Essentials of Digital Marketing**		
3	Credits	3		
4	Contact Hours (L-T-P)	3	0	0
	Course Status	Departmental 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 behaviors. 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		
	C	User Behaviour & Navigation		
	Unit 2	**Search Engine Optimisation**		
	A	Stakeholders in Search		CO2

	B	O n & off-page Optimisation			
	C	Meta Tags, Layout, Content updates Inbound Links & Link Building			
	Unit 3	**Web Site Analytics**			
	A	Goal Configuration &Funnels			CO3
	B	Intelligence Reporting			
	C	Conversions, Bounce Rate, Traffic Sources, Scheduling			
	Unit 4	**Social Media Marketing**			
	A	What is Social Media Marketing?			CO4,CO6
	B	Overview of Facebook, Twitter, LinkedIn, Blogging, Youtube and Flickr			
	C	Building Brand Awareness Using Social Media			
	Unit 5	**Digital Marketing Strategy**			
	A	Understanding strategy			CO5,CO6
	B	Email Marketing , Affiliate marketing Mobile Marketing ,			
	C	Display Advertising			
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	Digital Marketing: Global Strategies from the World's Leading Experts Jerry Wind , Vijay Mahajan			
	Other References	1. The Essentials of Digital Marketing Kathryn Waite and Rodrigo Perez-Vega			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1. infer digital marketing practices, inclination of digital consumers and their behaviors.	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,	PO1,PO2,PO3,PO4,PO7,PO10, PSO1,PSO2

	Marketing Analytics.	
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_ 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
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	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
	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: SET		**Batch : 2021**	
Program: MSc		**Current Academic Year: 2021**	
Branch: CS		**Semester:**	
1	Course Code	MCT116	Course Name
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.	
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	CO4

		networks; Single Layer and Multi-Layer n/w.			
	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	
		30%	20%	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	Program Outcomes (PO) & Program 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, PO11, PO12
4.	**CO4:** Classify supervised and unsupervised learning and knowledge representation.	PO6,PO11, PSO5
5.	CO5: To explore the scope of AI in various application domains.	PO9, PO11,PO12, PSO5

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

School: SET	**Batch : 2021-23**

Program: MSc		Current Academic Year: 2021	
Branch:CS		Semester: II	
1	Course Code	MCA366 | Course Name	
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 Hodoop Eco System • Apply analytics on Structured, Unstructured Data. • Exposure to Data Analytics with	
6	Course Outcomes	The students will be able to: • Identify Big Data and its Business Implications. • List the components of Hadoop and Hadoop Eco-System • Access and Process Data on Distributed File System • Manage Job Execution in Hadoop Environment • Develop Big Data Solutions using Hadoop Eco System	
7	Course Description		
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,	CO1,CO2,CO3

		Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.			
	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			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	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. 4. Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program 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,PO3,PO4,PSO3
4.	**CO4:** Manage Job Execution in Hadoop Environment	PO7, PO10,PO11, PSO5
5	**CO5:** Develop Big Data Solutions using Hadoop Eco System	PO4,PO8

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

	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	3	3	3	3	--	--	--	2	2	1	2	1	3	2	2	1	2
	CO2	3	2	3	3	--	--	--	2	2	2	1	1	2	3	2	1	2
	CO3	3	3	3	3	--	--	--	1	1	1	3	2	3	2	1	1	1
	CO4	2	2	2	2	1	--	--	2	3	3	3	1	2	2	2	1	3
	CO5	3	2	3	3	1	-	1	3	2	2	2	2	2	2	2	1	1

School:		**School of Engineering and technology**	
Department		**Department of Computer Science and Engineering**	
Program:		**Msc**	
Branch:		**CS**	
1	Course Code	MCT117	
2	Course Title	Android Application Development	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	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 / MTE / ETE	
		30% / 20% / 50%	
	Text book/s*	1. W.M Lee, "Begning 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	Program Outcomes (PO) & Program 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,PSO 1,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 **(Course Code** MCT117**)**

Course Code_ Course Name	CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCT117_ 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	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCT117	Android Application Development	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: SET		**Batch :** 2021-2022	
Program:		**Academic Year:** 2021-2022	
Branch: CSE		**Semester:** IV	
1	Course Code	**ARP208**	Course Name : **Quantitative and Qualitative Aptitude Skill Building**
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 – ARP208		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 | Verbal Abilities - 2	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
	Weightage Distribution	*(CA)Class Assignment/Free Speech Exercises / JAM – 60% | (ETE) Group Presentations/Mock Interviews/GD/ Reasoning, Quant & Aptitude – 40%*	
	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	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PS O1	PSO 2	PSO 3
ARP208.1	-	-	-	-	-	-	-	-	1	2	1	2	-	-	-
ARP208.2	-	-	-	-	-	-	-	-	1	2	1	2	-	-	-
ARP208.3	-	-	-	-	-	-	-	-	1	2	1	2	-	-	-
ARP208.4	-	-	-	-	-	-	-	-	1	2	1	2	-	-	-
ARP208.5	1	-	-	-	-	-	-	-	1	2	1	2	-	-	-
ARP208.6	1	-	-	-	-	-	-	-	1	2	1	2	-	-	-

School:		**School of Engineering and technology**
Department		**Department of Computer Science and Engineering**
Program:		**M.Sc**
Branch:		**CS**
1	Course Code	MCL118
2	Course Title	Data Structure and Analysis of Algorithm 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. 7. To study network flow and linear programming problems 8. To learn the dynamic programming design techniques. 9. To develop recursive backtracking algorithms.
6	Course Outcomes	CO1: **Analyze** algorithms and algorithm 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	This course starts with an introduction to data structures with its

	Description	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	**Searching**	
		-Write a c program to implement linear search. -Write a c program to implement binary search. - Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order: a) Quick sort b) Merge sort.	**CO1, CO2**
	Unit 2	Stack, Queue and Linked List	
		-Write a C program that uses functions to perform the following: a) Create a singly linked list of integers. b) Delete a given integer from the above linked list. c) Display the Contents of the above list after deletion. -Write a C program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array. - Write a program to implement queue and circular queue using array.	**CO2, CO3 CO6**
	Unit 3	Tree and Graphs	
		-Write a C program that uses functions to perform the following: a) Create a binary search tree of characters. b) Traverse the above Binary search tree recursively in Postorder. -Write C programs for implementing the following graph traversal algorithms: a) Depth first traversal b) Breadth first traversal. **- Write a program to implement Prim's and Kruskal's algorithm.**	**CO1,CO2, CO3, CO6**
	Unit 4	**Greedy and Dynamic Approach**	
		-WAP to implement Matrix Chain Multiplication and analyze its time complexity. -WAP to implement Longest Common Subsequence problem and analyze its time complexity. -WAP to implement 0/1 Knapsack problem and analyze its time complexity. -WAP to implement fractional Knapsack problem and analyze its time complexity.	**CO1, CO4, CO6**
	Unit 5	**Selected Topics**	
		-WAP to implement following string matching	**CO2, CO5**

		algorithms and analyze time complexities: a. Naïve b. Rabin karp -WAP to implement N Queen problem.			
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	4. Data Structure with C, Seymour Lipschutz, TMH 2. Data Structures using C. ReemaTharej , Oxford 5. Cormen et al., "Introduction of Computer Algorithms", Prentice Hall India 6. 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 Structure and Analysis of Algorithm Lab **(**MCL118**)**

Course Code_ Course Name	COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2
MCL118 _ Data Structure and Analysis of Algorithm Lab	CO 1	2	2	3	-	-	2		2	1	2	1	3
	CO 2	3	3	2	1	1	-		2		3	2	2
	CO 3	1		2	2	3	-				2		2
	CO 4		2	3	3	2	-				2	3	
	CO 5	2	1	3					2	2		1	2
	CO 6	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	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCL118	Data Structure and Analysis of Algorithm 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)extent2.*** Addressed to***Moderate (Medium=2) extent***
3. Addressed to***Substantial (High=3) extent***

Syllabus of Application Programming in Python Lab MCL119

School:		**School of Engineering and technology**
Department		**Department of Computer Science and Engineering**
Program:		**M.SC**
Branch:		**CS**
1	Course Code	MCL119
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 in database 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 • Program to access database	CO5,CO6
	Mode of examination	Jury/Practical/Viva	
	Weightage Distribution	CA / MTE / ETE	
		60% / 0% / 40%	
	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	

PO and PSO mapping with level of strength for Course Name Application Programming in Python Lab (Course Code MCL119**)**

Course Code_ Course Name	CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2

Application Programming in Python Lab	**CO1**	**2**	**1**	**1**	**1**	**1**	**-**	**2**	**-**	**-**	**1**	**2**	**2**
	CO2	**1**	**1**	**1**	**1**	**1**	**-**	**2**	**-**	**-**	**1**	**2**	**2**
	CO3	**2**	**2**	**2**	**1**	**1**	**-**	**2**	**-**	**-**	**1**	**2**	**2**
	CO4	**2**	**2**	**2**	**2**	**1**	**-**	**2**	**-**	**-**	**1**	**2**	**2**
	CO5	**2**	**2**	**2**	**2**	**1**	**-**	**2**	**-**	**-**	**1**	**3**	**3**
	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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCL119	**Application Programming in Python Lab**	**2**	**1.8**	**1.8**	**1.5**	**1.1**	**-**	**2**	**-**	**-**	**1**	**2.3**	**2.3**

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:		**School of Engineering and technology**
Department		**Department of Computer Science and Engineering**
Program:		**MSC CS**
Branch:		**Computer Science and Engineering**
1	Course Code	MCL-116
2	Course Title	**Artificial Intelligence Lab**
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Compulsory
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. ● To develop a sense of appreciation for traditional AI Programming ● To use classical AI problems to understand cognitive processes. ● To have an overview of the various processes involved in Machine Learning ● To develop a working model of real life problems based on Artificial Agent.
6	Course Outcomes	After the completion of this course, students will be able to: CO-1. ***Relate*** the goals of Artificial Intelligence and AI and non-AI solutions. CO-2. ***Analyze*** various AI uninformed and informed search algorithms. CO-3. ***Extend*** knowledge representation, reasoning, and theorem proving techniques to real-world problems CO-4. ***Make use of*** Machine learning algorithms in various application domains of AI. CO-5. ***Select*** Artificial Intelligent based applications.

		CO-6. ***Develop*** independent (or in a small group) research and communicate it effectively.			
7	Course Description	In this course students will learn basic introduction of Artificial Intelligence, problem solving agents, reasoning, learning and applications of artificial intelligence.			
8	Outline syllabus				CO Mapping
	Unit 1	**Practical based on goal based problems**			**CO1,CO2**
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 2	**Practical related to uninformed search algorithms.**			**CO2**
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 3	**Practical related to informed search algorithms.**			**CO3**
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 4	**Practical related to knowledge representations and logical reasoning**			**CO4**
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 5	**Practical related to machine learning algorithms**			**CO5,CO6**
		Sub unit - a, b and c detailed in Instructional Plan			
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	**1. Rich E** & Knight K, **Artificial Intelligence,** Tata McGraw Hill, Edition 3.			
	Other References	1. Russell S & Norvig P, *Artificial Intelligence: A Modern Approach*, Prentice Hall. 2. Dan W. Patterson, Artificial Intelligence & Expert Systems, Pearson Education with Prentice Hall India. Indian Edition.			

Course Outcomes:

Sl. No.	Course Outcome (CO)	
CO-1:	***Relate*** the goals of Artificial Intelligence and AI and non-AI solutions.	PO3, PO4, PO5, PO10, PSO1, PSO2, PSO3
CO-2:	***Analyze*** various AI uninformed and informed search algorithms.	PO1, PO2, PO3, PO4, PO5, PO10, PSO1, PSO2, PSO3
CO-3:	***Extend*** knowledge representation, reasoning, and theorem proving techniques to real-world problems	PO1, PO2, PO3, PO4, PO5, PO12, PSO1, PSO2, PSO3
CO-4:	***Make use of*** Machine learning algorithms in various application domains of AI.	PO1, PO2, PO3, PO4, PO5, PO12, PSO1, PSO2, PSO3
CO-5:	***Select*** Artificial Intelligent based applications.	PO1, PO2, PO3, PO4, PO5, PO9, PO10 PO12, PSO1, PSO2, PSO3
CO-6:	***Develop*** independent (or in a small group) research and communicate it effectively.	PO1, PO2, PO3, PO4, PO5, PO9, PO10 PO12, PSO1, PSO2, PSO3

PO and PSO mapping with level of strength for Course Name Artificial Intelligence Lab (Course Code MCL-116 **)**

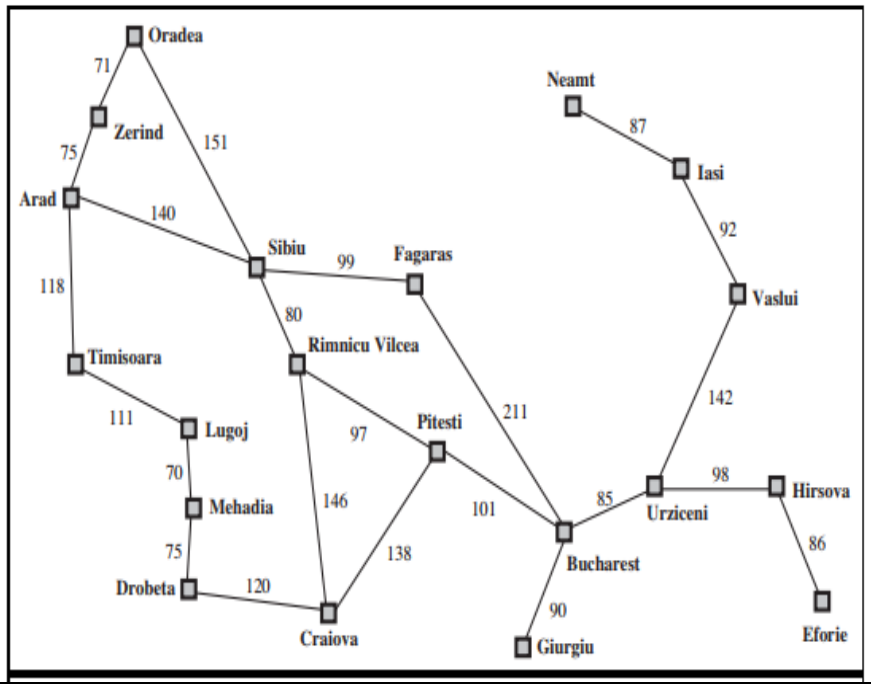
Course Code_ Course Name	CO's	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSP 312: Artificial Intelligence Lab	CO1	1	2	3	2	2					2		2	3	2	2
	CO2	2	3	3	2	3					2		2	3	3	2
	CO3	3	3	3	3	2	1	1			1	2	3	3	2	3
	CO4	3	3	3	3	2	2	1			2	1	3	3	2	3
	CO5	2	3	3	3	3	2	2	2	3	2	2	2	3	3	2
	CO6	2	3	3	3	3	2	2	2	3	2	2	2	3	3	2
		2.2	2.8	3.0	2.7	2.5	1.2	1.0	0.7	1.0	1.8	1.2	2.3	3.0	2.5	2.3

Strength of Correlation

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

List of Practical's:

	Unit 1	**Practical based on goal based problems**	
Week 1,2	B	Lab expt.1,2	Introduction to Lisp and Prolog, and basic programming concepts like following: i. Write a LISP function to compute the sum of squares. ii. Write a LISP function to compute the difference of squares. (if x > y return $x^2 - y^2$, Otherwise $y^2 - x^2$). iii. Write a Recursive LISP function which takes one argument as a list and returns the last element of the list. (Do not use the last predicate.) iv. Write a Recursive LISP function which takes one argument as a list and returns a list except the last element of the list. (Do not use butlast.) v. Write a Recursive LISP function which takes one argument as a list and returns the reverse of the list. (Do not use reverse predicate). vi. Write a Recursive LISP function which takes two arguments first an atom second a list returns a list after removing the first occurrence of that atom within the list. vii. Write a Recursive LISP function which appends two lists together. viii. Write a recursive LISP function which takes 2 lists as arguments and returns a list containing alternate elements from each list.
Week 3	c	Lab expt.3	Advance programming in Lisp like following: i. Write a function that compute the factorial of a number.(factorial of 0 is 1, and factorial of n is n*(n-

			1)*...1.Factorial is defined only for integers greater than or equal to 0.) ii. Write a function that evaluates a fully parenthesized infix arithmetic expression. For examples, (infix (1+ (2*3))) should return 7.
	Unit 2	**Practical related to uninformed search algorithms.**	
Week 4,5	a, b,	Lab expt.4	Refer following figure as map with distance details, Write a program in your preferred language to generate path from ARAD to BUCHAREST, analyze result obtained by a) Depth First Search b) Breadth First Search c) Uniform Cost Search 
Week 6	c	Lab expt.5	Write a program to implement Hill Climbing Approach.
	Unit 3	**Practical related to informed search algorithms.**	
Week 7	Mid term		
Week 8	a,b,c	Lab expt.6	Write a program in your preferred language to solve the 8 puzzle Problem-using A* algorithm.
	Unit 4	**Practical related to knowledge representations and logical reasoning**	
Week 9	A	Lab expt.7	Write a PROLOG program to categorize animal characteristics.
Week 10	B	Lab expt.8	Write PROLOG program to solver for the linear equation A*X + B = 0. Let the predicate linear (A, B, X) return the root X of the equation.
Week 11	c	Lab expt.9	Write a PROLOG program that answers questions about family members and relationships including predicates and rules which define sister, brother, father, mother, grandchild, grandfather and uncle. The program should be able to answer queries such as the following: father(x, Amit)

			grandson(x, y) uncle (sumit, puneet) mother (anita, x)
Week 12	c	Lab expt.10	Write a program for the Implementation of Water Jug Problem.
	Unit 5	**Practical related to machine learning algorithms**	
Week 12	a,	Project	Project Work Evaluation-0: Problem Statement
Week 13	b	Project	Project Work Evaluation-1: Design Specification
Week 14	c	Project	Project Work Evaluation-2: Development

School: SET		**Batch: 2021**	
Program: MSc		**Current Academic Year: 2021-22**	
Branch:CS		**Semester: II**	
1	Course Code	MCP366 | Course Name	
2	Course Title	Big Data Analytics LAB	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	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 Hodoop 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	
7	Course Description	To Demonstrate or develop a practical level of proficiency using Hadoop, statistical software R, SQL database access for data acquisition.	
8	Outline syllabus		CO Mapping
		1. To implement the following file management tasks in Hadoop System (HDFS): Adding files and directories, Retrieving files, Deleting files	CO1, CO2, CO4
		2. To run a basic Word Count MapReduce program to understand MapReduce Paradigm: To count words in a given	CO1, CO2,

		file, To view the output file, and To calculate execution time.	CO3
		3. To perform NoSQL database using mongodb to create, update and insert.	CO1, CO2, CO4
		4. To study and implement basic functions and commands in R Programming.	CO1, CO2, CO3
		5. To build WordCloud, a text mining method using R for easy to understand and visualization than a table data.	CO1, CO2, CO3
		6. To implement Bloom Filters for filter on Stream Data in C++/java.	CO3, CO4
		7. To implement Flajolet-Martin Algorithm for counting distinct elements in Stream Data.	CO3, CO5
		8. To implement clustering program using R programming.	CO3, CO5
		9. To find Term Frequency and Inverse Document Frequency (tf-idf) Matrix for Recommendation Systems and Plot TF Using R used.	CO2, CO3, CO5
		10. To finding similar documents with Cosine Similarity in R.	CO2, CO3, CO5
	Mode of examination	Jury/Practical/Viva	
	Weightage Distribution	CA / MTE / ETE	
		60% / 0% / 40%	
	Text book/s*	3. Tom White "Hadoop: The Definitive Guide" Third Edit on, O'Reilly Media, 2012. 4. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015	
	Other References	5. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007. 6. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013) 7. 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. 8. Anand Rajaraman and Jeffrey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.	

CO and PO Mapping

S.	Course Outcome	Program Outcomes (PO)

No.		& Program 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,PO3,PO4,PSO3
4.	**CO4:** Manage Job Execution in Hadoop Environment	PO7, PO10,PO11, PSO5
5	**CO5:** Develop Big Data Solutions using Hadoop Eco System	PO4,PO8

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

	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	3	3	3	3	--	--	--	2	2	1	2	1	3	2	2	1	2
	CO2	3	2	3	3	--	--	--	2	2	2	1	1	2	3	2	1	2
	CO3	3	3	3	3	--	--	--	1	1	1	3	2	3	2	1	1	1
	CO4	2	2	2	2	1	--	--	2	3	3	3	1	2	2	2	1	3
	CO5	3	2	3	3	1	-	1	3	2	2	2	2	2	2	2	1	1

MCL117: Android Application Development Lab

School:		**School of Engineering and technology**		
Department		**Department of Computer Science and Engineering**		
Program:				
Branch:				
1	Course Code	MCL117		
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: Describe the anatomy of an android application. CO2: Demonstrate Interactive user interfaces for android application. CO3:Develop inter- app activity communication using essential android programming concept CO4: Examine different components of Android CO5: Explore database usage in android application. CO6 Develop advance android application 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**		
		Program related to Activity		CO1
	Unit 2	**Android User Interfaces**		
		Program related to Layout and UI		CO1,CO2
	Unit 3	**Components of Android**		

		Program related to Intent, Service and Notification			CO3
	Unit 4	**Working with SQL Lite**			
		Program related to SQLite database			CO4,CO5
	Unit 5	**Sensors and Animation**			
	A	Program related to Sensor			CO6
	Mode of examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	3. W.M Lee, "Begning Android 4 Application Development",Wiley 4. Retro Meier,"Android 4 Application Development",Wiley			
	Other References	3. Lauren Darcy, Shane Conder, Sams Teach Yourself Android Application Development in 24 Hrs, 1st ed. 4. Jeff Mcwherter, Scott Gowell, Professional Mobile Application Development, Wrox Publisher(2012), 1st ed.			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Describe the anatomy of an android application.	PO1,PO4,PO5,PO10
2.	CO2: Demonstrate Interactive user interfaces for android application.	PO2,PO3,PO4,PO5,PO9,PO10,PSO1,PSO2
3.	CO3:Develop inter- app activity communication using essential android programming concept	PO1,PO4,PO5,PO10,PSO1
4.	CO4: Examine different components of Android	PO4,PO5,PO10
5.	CO5: Explore database usage in android application.	PO1,PO2,PO4,PO5,PO7,PO9,PO10,PSO1
6.	CO6 Develop advance android application 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 **(Course Code** MCL117**)**

Course Code_ Course Name	CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCL117_ 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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2
MCA272	Android Application Development	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: SET		**Batch : 2020 – 2023**		
Program: MSc		**Current Academic Year: 2021**		
Branch: CS		**Semester: 2nd**		
1	Course Code	**MCL196**	Course Name: Project Based Learning -2	
2	Course Title	Project Based Learning -2		
3	Credits	1		
4	Contact Hours (L-T-P)	0-0-2		
	Course Status	Compulsory		
5	Course Objective	1. To align student's skill and interests with a realistic problem or project 2. To understand the significance of problem and its scope 3. Students will make decisions within a framework		
6	Course Outcomes	Students will be able to: CO1: Identify and formulate problem statement with systematic approach. CO2: Develop teamwork and problem-solving skills, along with the ability to communicate effectively with others. CO3: Design the problem solution as per the problem statement framed. CO4: Explain the characteristics, architecture of database approach, describe the components of the project. CO5: Fabricate and implement the solution by using different object oriented concepts like encapsulation, polymorphism etc. CO6: Develop a glory of the need to engage in life-long learning.		
7	Course Description	In PBL-2, the students will learn how to define the problem for developing projects, identifying the skills required for developing the project based on given a set of specifications and all subjects of that Semester.		
	Mode of examination	Practical /Viva		
	Weight age Distribution	CA	MTE	ETE
		60%	NA	40%

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO)
1.	CO1: Identify and formulate problem statement with	PO1, PO2, PO10, PSO1,PSO2

	systematic approach.	
2.	CO2: Develop teamwork and problem-solving skills, along with the ability to communicate effectively with others.	PO1, PO2, PO3,PO4, PO8, PO9,PSO1,PSO2
3.	CO3: Design the problem solution as per the problem statement framed.	PO1, PO2, PO3, PO4,PO9, PO10, PSO1,PSO2
4.	CO4: Explain the characteristics, architecture of database approach, describe the components of the project.	PO1, PO6, PO9,PSO2
5.	CO5: Fabricate and implement the solution by using different object oriented concepts like encapsulation, polymorphism etc.	PO3, PO4, PO6, PO7, PO8, PO9, PO10,PSO1,PSO2
6.	CO6: Develop a glory of the need to engage in life-long learning.	PO10,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Project Based Learning -2 (MCL196)

CO/PO Mapping (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Low												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	3	2	2
CO2	3	2	3	3	-	-	2	3	3	-	2	2
CO3	3	2	-	-	2	-	-	-	3	3	2	2
CO4	3	3	-	-	-	2	-	-	3	3	2	2
CO5	-	-	2	2	2	2	3	3	3	3	2	2
CO6	-	-	-	-	-	-	-	-	-	3	2	2

TERM-III

School: SET		**Batch : 2021 onwards**	
Program: MSc		**Current Academic Year: 2020**	
Branch: CS		**Semester: 3**	
1	Course Code	**MCT213**	
2	Course Title	**Computer Graphics and Animation**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Core	
5	Course Objective	This course is designed to provide a comprehensive introduction to computer graphics and animation. A thorough introduction to graphics techniques, two dimensional system and mapping, important drawing algorithm, two-dimensional transformation; Clipping, filling and an introduction to 3-D graphics. This course also provide students the fundamental skills to produce traditional style animation and the knowledge of principles of animation.	
6	Course Outcomes	Students will be able to: **CO1:** *Analyse* and classify the components and building approaches of computer graphics systems. **CO2:** *Illustrates* the technology requirement for a computer graphics system. **CO3:** *Design* interactive computer graphics API programs. **CO4:** *Apply* in-depth knowledge of display systems, image synthesis, shape, modelling, and interactive control of 3D computer graphics applications. **CO5:** *Formulate* an understanding of mapping from a world coordinates to device coordinates, clipping, and projections. **CO6:** *Discuss* the application of computer graphics and animation concepts in the development of computer games, information visualization, and business applications.	
7	Course Description	Computer Graphics and animation is a study of the hardware and software principles of interactive raster graphics and animation techniques. Topics include an introduction to the basic concepts, 2-D and 3-D modelling and transformations, viewing transformations, projections, rendering techniques, graphical software packages and graphics systems.	
8	Outline syllabus		CO Mapping
	Unit 1	**Graphic System Primitives**	
	A	Display devices, Input and Output Devices. Output Primitives: Points and Lines, Pixels, Pixel addressing and Object Geometry, Planes, Frame buffers, vector and character generation	CO1, CO2
	B	Line-Drawing Algorithms-DDA and Brenham's algorithms. Circle-Generating algorithms	CO1, CO2
	C	Scan-Line, Polygon Fill algorithms, Boundary Fill and Flood-Fill Algorithms	CO1, CO2,CO3
	Unit 2	**Transformations**	
	A	Basic Transformations, Composite Transformations	CO1, CO2,CO3

	B	General Fixed-Point Scaling, Other Translations- Reflection, Shear	CO2, CO3
	C	Transformations between Coordinate Systems, Raster Methods for Transformations	CO1, CO2,CO3
	Unit 3	**Windowing and Clipping And 3D Transformation**	
	A	Window, Viewport, Window-To-Viewport Coordinate transformation, zooming and panning, Clipping Operations, Point Clipping, Line Clipping- Cohen-Sutherland Line Clipping, Cohen-Sutherland Line Clipping Algorithm, Midpoint Subdivision Line Clipping Algorithm, Cyrus Beck clipping	CO2,CO3,CO4
	B	3-D transformation: Translation, Rotation, Scaling, Shearing, Reflecting	CO2,CO3,CO4
	C	Composite Transformations, Rotation about an arbitrary line, Reflection through an arbitrary plane.	CO2,CO3,CO4
	Unit 4	**Parallel Projections & Hidden surface Removal**	
	A	Orthographic Projections, Oblique Projections, Parallel Projections	CO4,CO5
	B	Perspective Projections, One Point, Two, Three Point vanishing points	CO4,CO5
	C	Back Face Detection, Depth Buffer Method, Depth Sorting Method (Painter's algorithm)	CO3,CO4,CO5
	Unit 5	**Animation**	
	A	Introduction to Animation, Principles of Animation, Types of Animation. Moving, Rotating, and Scaling, Viewing Your Animation	CO2,CO5,CO6
	B	The Graph Editor Window, Editing the Curve, Other Types of Curves, Modifying Curves, Automatic Key Framing, Rotation Explained, Rotation Using F Curves,	CO2,CO5,CO6
	C	Animating Other, Features, Keying Sets, Vertex Animation, Animation Following Curves, Displacement Sound Animation Control	CO3,CO6
	Mode of examination	Theory	
	Weightage Distribution	CA / MTE / ETE	
		30% / 20% / 50%	
	Text book/s*	1. J. Foley, V. Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, Latest Edition.	
	Other References	1. D. Rogers, J. Adams, "Mathematical Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill Publication, Latest Edition. 2. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002. 3. D. Rogers, "Procedural Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill Publication, Latest Edition.	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Analyse and classify the components and building approaches of computer graphics systems.	PO1, PO2, PO3, PO4, PO5, PO7, PO10, PSO1, PSO2
2.	CO2: Illustrates the technology requirement for a computer graphics system.	PO1, PO2, PO3, PO4, PO10, PSO1, PSO2
3.	CO3: Design interactive computer graphics API programs.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO10, PSO1, PSO2
4.	CO4: Apply in-depth knowledge of display systems, image synthesis, shape, modelling, and interactive control of 3D computer graphics applications.	PO1, PO2, PO3, PO4, PO5, PO8, PO10, PSO1, PSO2
5	CO5: Formulate an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.	PO1, PO2, PO3, PO5, PO6, PO10, PSO1, PSO2
6	CO6: Discuss the application of computer graphics and animation concepts in the development of computer games, information visualization, and business applications.	PO1, PO2, PO3, PO4, PO5,PO6, PO7, PO8, PO9, PO10, PSO1, PSO2

PO and PSO mapping with level of strength

Course Objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	1	3	1	2	-	1	-	-	2	3	2
CO2	1	3	3	2	-	-	-	-	-	3	1	2
CO3	3	1	2	1	1	1	1	-	-	1	2	1
CO4	2	2	1	3	1	-	-	2	-	1	2	3
CO5	2	2	1	-	2	2	-	-	-	1	3	2
CO6	1	3	2	2	3	2	2	2	2	2	1	3
	1.8	2.0	2.0	1.8	1.8	1.7	1.3	2.0	2.0	1.7	2.0	2.2

School: SET		**Batch : 2021**	
Program: MSc		**Current Academic Year: 2021**	
Branch:CS		**Semester: III**	
1	Course Code	MCT214	
2	Course Title	Web and its application	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	Provide the knowledge to design and develop web application with and without database. Students will gain the skills and project-based experience needed for entry into web application and development careers.	
6	Course Outcomes	CO1: Examine the functionality required in our Website. Use javascript for clientside validation CO2: Explain the concept of servlet and EJB CO3: Use JSP for creating dynamic website CO4: Analyse the requirement of Jquery and Ajax CO5: Evaluate the use of RMI and netwroking. CO6: Develop a website using Jsp, Jquery , Ajax, etc.	
7	Course Description	This course is an overview of the modern Web technologies used for the Web development. The purpose of this course is to give students the basic understanding of how things work in the Web world from the technology point of view as well as to give the basic overview of the different technologies.	
8	Outline syllabus		CO Mapping
	Unit 1	**INTRODUCTION TO HTML & JAVA SCRIPT**	
	A	HTML basic tags, various links implementation, image map, table formatting, form design.	CO1
	B	**Java Script:** Introduction, syntax, comment, statement, variable, operators, Conditional statements, loop statements	CO1
	C	Functions, object, events, Accessing form elements, validating form elements	CO1
	Unit 2	**Servlets & ENTERPRISE JAVA BEANS**	
	A	Servlet, Creating Servlet, Managing request and response in Servlet,	CO2
	B	Servlet Collaboration, Session Tracking	CO2
	C	EJB - Introduction, Components of EJB, Architecture of EJB	CO2
	Unit 3	**JAVA SERVER PAGES**	
	A	Introduction to JSP , Life cycle of JSP,JSP Application Design	CO3, CO6
	B	Scripting elements, scriptlet tag, expression tag, declaration tag,	CO3 CO6
	C	Implicit Objects, JSP Objects, Directive Elements	CO3, CO6
	Unit 4	**Jquery& AJAX**	
	A	**Jquery& AJAX:** Introduction, syntax, selector, events,Jquery effect: hide/show, fade, slide, animate and stop	CO4, CO6
	B	Jquery HTML: get, set, add, remove, css	CO4, CO6
	C	AJAX: Introduction, request, response, event	CO4, CO6
	Unit 5	**RMI AND JAVA NETWORKING**	
	A	Remote Method Invocation - Introduction, Structure of RMI	CO5
	B	Sockets: Introduction, Application, TCP socket, UDP socket	CO5

	C	Socket Implementation, Client and Server sockets, data transmission over socket			CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. Ivan Bayross,"HTML,DHTML, JavaScript, Perl & CGI", BPB Publication 2. Schildt H, "The Complete Reference JAVA2", TMH 3. Schildt H, "The Complete Reference J2EE", TMH			
	Other References	1. Rick Delorme," Programming in HTML5 with JavaScript and CSS3", Microsoft			

PO and PSO mapping with level of strength for Course Name Web and its Applications (Course Code MCT214)

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	PO 11	PO 12	PSO 1	PSO2	PSO3
	CO1			2		2				3			2			
	CO2			2		2				3						
	CO3			2		2				3			2	2	3	
	CO4			2		2				3						
	CO5			2		2				3						
	CO6	3	3	3		2	3	2		3		2	3	3	3	2

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

Course Code	Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
		3	3	2.16		2	3	2		3		2	2.33	2.5	3	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***

Syllabus: MCT211 Data Mining and Knowledge Discovery

School: SET		**Batch : 2021**	
Program: MSc		**Current Academic Year: 2021**	
Branch: CS		**Semester:**	
1	Course Code	MCT211 | Course Name: **Data Mining and Knowledge Discovery**	
2	Course Title	**Data Mining and Knowledge Discovery**	
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 methodologies and approaches to data mining 2. Gain insight into the challenges and limitations of different data mining techniques 3. Provide the students with practice on applying data mining solutions 4. Prepare students for research in the area of data mining and related applications 5. Enhance students communication and problem solving skills	
6	Course Outcomes	Students will be able to: CO1: To understand the basic concept of datamining CO2: Demonstrate the Data Pre processing & transfprmation Techniques CO3: Explain Various Pattern Mining Methodology CO4: Compare & Contrast Classification& Prediction Mechanism CO5: Experiment with Clustering Algorithms CO6: Apply Data mining Techniques in real world Knowledge Discovery	
7	Course Description	This course introduces advanced aspects of data warehousing and data mining, encompassing the principles, to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Evolution of Data mining and introductory concepts,	CO1
	B	Knowledge Discovery Process,	
	C	Introduction to outlier.	
	Unit 2	**Data Pre processing**	
	A	Descriptive Data Summarization, Data Cleaning,	CO1, CO2,CO6
	B	Integration and Transformation,	
	C	Data Reduction, Discretization and Concept Hierarchy Generation.	
	Unit 3	**Frequent Pattern Mining**	
	A	Efficient and Scalable Frequent Itemset Mining Methods: Aprori	CO3, CO6
	B	FPGrowth, ECLATS	
	C	correlation Analysis.	
	Unit 4	**Classification& Prediction**	
	A	What is classification, requirements of classification, Decision Tree-ID3Algorithm, ,	CO4, CO6
	B	Naive Bayes Classifier, Rule Based classification, Backpropogation	
	C	Support Vector Machine for linearly separable data. Prediction: - Linear Regression.	

	Unit 5	**Clustering**			
	A	What is cluster analysis, requirements of cluster analysis,			CO5,CO6
	B	Partitioning methods-k-means and k-mediods,			
	C	Hierarchical Methods-Agglomerative and divisive, Density based methods- DBSCAN			
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. J.Han,M. Kamber, J. Pei "*Data Mining Concepts and Techniques"*,Edition:3 , Morgan Kaufmann			
	Other References	1. M.H. Dunham, *Data Mining Introductory and Advanced Topics*, Pearson Education. 2. Adriaans, *Data Mining*, Pearson Education 3. VikramPudi& P. Radhakrishnan, "Data Mining", Oxford University Press			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes(PSO)
1.	CO1: To understand the basic concept of datamining	PO1,PO10
2.	CO2: Demonstrate the Data Pre processing & transformation techniques	PO1, PO5, PO10
3.	CO3: Explain Various Pattern Mining Methodology	PO1 ,PO2, PO3,PO5
4.	CO4: Compare & Contrast Classification& Prediction Mechanism	PO1, PO2 PO3, PO4, PSO1, PSO2
5	CO5 :Experiment with Clustering Algorithms	PO1 ,PO2 PO3,PO4,PO5, PSO1, PSO2
6	CO6: Apply Data mining Techniques in real world Knowledge Discovery	PO2, PO3,PO4,PO5,PO6,PO7,PO8,PO9,PO10, PSO2

PO and PSO mapping with level of strength for Course Name Data Mining & Knowledge discovery (Course Code MCT211)

	Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
MCT211/ DMKD		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	-	-
	CO2	3	-	-	-	-	-	-	-	-	3	-	-
	CO3	2	2	2	-	2	-	-	-	-	-	-	-
	CO4	2	2	2	3	-	-	-	-	-	-	2	2

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

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

Course Code/ Name	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO 2**
MCT211/ DMKD	3	2.5	2.5	3	2.3	2	2	2	3	2.6	2	2.3

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: SET		**Batch : 2021-23**	
Program: MSc		**Current Academic Year: 2021**	
Branch:CS		**Semester: 3**	
1	Course Code	**MCT212**	
2	Course Title	**Mobile Technologies**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status		
5	Course Objective	The objective of the course is to impart knowledge of mobile and wireless computing systems and techniques.	
6	Course Outcomes	On successful completion of this module students will be able to **CO1:** Synthesize the basic concepts and principles in mobile computing. **CO2:** Analyze the concept of wireless and their communication. **CO3:** Synthesize the structure and components for mobile IP and mobility Management.	
7	Course Description	This course introduces advanced aspects of mobile generation & cellular system. Also impart knowledge of Satellite broadcast system & routing algorithms based on wireless network.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Issues, challenges, and benefits, Mobile radio communication fundamentals, overview of mobile generation 1G,2G,3G,4G and 5G	CO1
	B	Fundamental of wireless communication, bandwidth concept, type of signals, path loss, modulation: shift key modulation, Spread spectrum modulation, MAC issue	CO1,CO2
	C	Multiple Access: FDMA, TDMA, CSMA/CD, SDMA, CDMA	CO1,CO2
	Unit 2	**Cellular System**	
	A	Cell concepts, frequency and channel allocation, frequency reuse concepts: sectorization and clustering, Handoff	CO1,CO2
	B	Global System for Mobile Communication (GSM) System Overview: GSM Architecture, channels, Mobility Management, localization and calling	CO1,CO2,CO3
	C	General Packet Radio Service (GPRS): GPRS Architecture, GPRS network nodes, EDGE, 3G and 4G, Cognitive Radio Network (5G)	CO1,CO2
	Unit 3	**Satellite & Broadcast System**	
	A	Basics concepts of satellite and Applications, types of satellite	CO1
	B	Cyclical repetition of data, Digital audio/ video broadcasting, Broadcasting convergence and mobile communication	CO1,CO2
	C	HD radio, working of DTH (Direct To Home)	CO2
	Unit 4	**Wireless network & Routing Algorithm**	
	A	Mobile IP, DHCP, Mobile Adhoc Network, Hidden and exposed terminal problems	CO2,CO3
	B	Bluetooth, Wi-Fi Standard, WiMAX Standard, Zigbee, Ultra-wideband(UWB)	CO2,CO3
	C	Routing protocols classification, challenges in MANET	CO2,CO3

		routing, DSDV, DSR, AODV			
	Unit 5	**Mobile Transport Layer**			
	A	Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Transaction oriented TCP			CO2,CO3
	B	TCP over 2.5G/3G/4G wireless network, File System			CO2
	C	World Wide Web, Wireless Application Protocol: architecture, protocol stack			CO2,CO3
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	**1.** JochenSchiller : Mobile Communication, Pearson Education. 2. U. Hansman and L. Merck : Principles of Mobile Computing", 2nd Ed., Springer			
	Other References	1. D. Milojicic, F. Douglis. : Mobility Processes, Computers and Agents", Addison Wesley 2. Willium C. Y. Lee, "Mobile communication Design and fundamentals" 3. D. R. KamiloFehar, "Wireless digital communication" 4. Haykin,S and Moher,M., "Modern wireless communication", Pearson. 5. T.S. Rappaport, "Wireless Communication-Principles and practice", Pearson			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:**Synthesize the basic concepts and principles in mobile computing.	PO1,PSO4
2.	**CO2:**Analyze the concept of wireless and their communication.	PO1,PO2,PSO2
3.	**CO3:**Synthesize the structure and components for mobile IP and mobility Management.	PO1,PO3,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Mobile Technologies (Course Code MCT212)

	Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	3	2	1	1	1	2	2	2	1	1	1	2	2	2	2	3	1
	CO	3	3	1	1	1	2	2	2	2	2	2	2	2	3	2	2	1

	2																	
	CO3	3	1	3	1	1	1	1	2	1	1	1	1	3	3	2	1	2

School: SET		**Batch : 2021**	
Program: MSc		**Current Academic Year: 2021**	
Branch:		**Semester: III**	
1	Course Code	MCA271	
2	Course Title	**Cloud Computing**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status		
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 students communication and problem solving skills	
6	Course Outcomes	At the end of the course, students will have achieved the following learning objectives. 1. Define the basics of cloud and recall the computer Science concepts which are helpful in understanding on demand service architecture. 2. Classify and describe the architecture and taxonomy of parallel and distributed computing, including shared and distributed memory, and data and task parallel computing. 3. Apply and Manage Virtualization and Workflow to use the cloud in file systems and applications. 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. 5. Evaluate the importance of cloud using monitoring and management of services for performance improvement of HPC and to follow the Governance and Compliances. 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, Layers and Types of Clouds, Desired Features of a Cloud, Cloud Infrastructure Management, Understanding Services: SaaS, PaaS, IaaS C. Infrastructure as a Service Providers, Platform as a Service	CO1, CO2, CO3

		Providers, 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, VM Provisioning and Manageability, Virtual Machine Migration Services, VMware, vSphere 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	A. Introduction of CometCloud, Aneka and CloudSim, 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	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	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
		30%	20%

	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	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	Define the basics of cloud and recall the computer Science concepts which are helpful in understanding on demand service architecture.	PO1, PO2,PO3,PSO3
2.	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,PO3,PSO1,PSO3
3.	Apply and Manage Virtualization and Workflow to use the cloud in file systems and applications.	PO1,PO2,PO3,PSO1,PSO2
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.	PO1,PO2,PO4,PSO1,PSO2
5.	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,PSO3
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.	PO1,PO2,PO3,PSO1,PSO2,PSO3

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

	Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	1	3	3	--	--	--	--	--	--	--	--	--		--	2

	CO2	3	2	2	--	--	--	--	--	--	--	--	--	1		2
	CO3	3	2	--	3	--		--	--	--	--	--	--	2	3	--
	CO4	3	3	--	2	--		--	--	--	--	--	--	2	3	--
	CO5	2	2	--	2	--		--	--	--	--	--	--	3	--	2
	CO6	3	2	1		--		--	--	--	--	--	--	3	2	2

Course Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
		2.5	2.3	1	1.16									1.83	1.3	1.3

MCT213, Theory of Computation

School: SET	Batch : 2021-23

Program: M.Sc.		**Current Academic Year:**	
Branch:CS		**Semester:III**	
1	Course Code	MCT213	Course Name: Theory of Computation
2	Course Title	Theory of Computation	
3	Credits		
4	Contact Hours (L-T-P)	3-1-0	
	Course Status		
5	Course Objective	The goal of this course is to provide students with an understanding of basic concepts in the theory of computation.	
6	Course Outcomes	Students will be able to: **CO1: Formulate** the concept of Automata and related terminology. **CO2: Design** DFA and NDFA and conversion from NDFA to DFA. **CO3: Construct** finite automata without output and with output. **CO4:Implement** regular expression and grammar corresponding to DFA and vice-versa **CO5: Design** Push down Automata from Context Free Language or Grammar and vice-versa. **CO6: Design** Turing Machine for computational problems, Develop a clear understanding of un-decidability.	
7	Course Description	The course introduces some fundamental concepts in automata theory and formal languages including grammar, finite automaton, regular expression, formal language, pushdown automaton, and Turing machine. Not only do they form basic models of computation, they are also the foundation of many branches of computer science, e.g. compilers, software engineering, concurrent systems, etc. The properties of these models will be studied and various rigorous techniques for analyzing and comparing them will be discussed, by using both formalism and examples.	
8	Outline syllabus		CO Mapping
	Unit 1	**Finite Automata**	
	A	Introduction to languages, Kleene closures, Finite Automata (FA), Transition graph, Nondeterministic finite Automata (NFA), Deterministic finite Automata (DFA).	CO1, CO2
	B	Equivalence of NDFA and DFA, Construction of DFA from NFA and optimization of Finite Automata.	CO1, CO2
	C	Applications and Limitation of FA. (FAT tool).	CO1, CO2
	Unit 2	**Regular Expression and Finite Automata**	
	A	Regular Expression, Finite Automata with null move, Regular Expression to Finite Automata.	CO1, CO2,CO4
	B	Arden Theorem, Pumping Lemma for regular expressions.	CO1, CO2,CO4
	C	FA with output: Moore machine, Mealy machine and Equivalence.	CO1, CO2,CO3
	Unit 3	**REGULAR & CONTEXT FREE LANGUAGE**	
	A	Defining grammar, Chomsky hierarchy of Languages and Grammar. Ambiguous to Unambiguous CFG.	CO4
	B	Simplification of CFGs.	CO4
	C	Normal forms for CFGs, Pumping lemma for	CO4

		CFLs.			
	Unit 4	**PUSH DOWN AUTOMATA**			
	A	Description and definition of PDA and Non-Deterministic PDA, Working of PDA.			CO5
	B	Acceptance of a string by PDA with final state and with Null store. Two stack PDA.			CO5
	C	Conversion of PDA into CFG, Conversion of CFG into PDA.			CO5
	Unit 5	**TURING MACHINE**			
	A	Turing machines (TM): Basic model, definition and representation, Language acceptance by TM.			CO6
	B	Turing machine as a computational machine, Halting problem of TM, Universal TM (Visual Turing machine).			CO6
	C	Modifications in TM, Undecidability of Post correspondence problem, Church's Thesis, Godel Numbering.			CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science(Automata, Languages and Computation)", PHI			
	Other References	1.Peter Linz, "Formal Languages and Auomata", Narosa Publishing House 2.Hopcroft, Ullman, "Introduction to Automata Theory, Language and Computation", Narosa Publishing House			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:** Formulate the concept of Automata and related terminology.	PO1,PO2,PO3,PO4,PO5, PO9,PO12,PSO1,PSO2
2.	**CO2:** Design DFA and NDFA and conversion from NDFA to DFA.	PO1, PO3, PO4, PO5, PO9, PO12 PSO2, PSO3
3.	**CO3:** Construct finite automata without output and with output.	PO1,PO2,PO3,PO4, PO9,PSO1,PSO2
4.	**CO4:** Implement regular expression and grammar corresponding to DFA and vice-versa	PO1,PO2,PO3, PO5,PO9, PO12 PSO3
5	**CO5:** Design Push down Automata from Context Free Language or Grammar and vice-versa .	PO1,PO2,PO3,PO4, PO5, PO9, PO12,PSO1,PSO2,PSO3
6	**CO6:** Design Turing Machine for computational problems,Develop a clear understanding of un-decidability.	PO1,PO2,PO3,PO4,PO5PO9, PO12, PSO1, PSO2,PSO3

PO and PSO mapping with level of strength for Course Name Theory of Computation **(Course CodeMCT 213)**

Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	3	2	--	--	--	3	--	--	3	3	2	--
CO 2	3	--	3	3	2	--	--	--	2	--	--	2	--	3	2
CO 3	3	3	3	3	--	--	--	--	2	--	--	--	3	2	--
CO 4	2	2	2	--	2	--	--	--	3	--	--	2	--	--	3
CO 5	3	3	3	3	3	--	--	--	--	--	--	3	3	2	2
CO 6	3	2	3	3	3	--	--	--	2	--	--	3	3	3	2

1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

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	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSE251	TOC	2.8	2.1	2.8	2.5	2	--	--	--	2	--	--	2.1	2	2	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:	**School of Engineering and technology**
Department	**Department of Computer Science and Engineering**
Program:	**MSc**

Branch:		CS		
1	Course Code	MCT215		
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 in Computing Environment and Cryptography**		
	A	Need for Security, Security Attack, Security Services, Information Security, Methods of Protection.		CO1, CO2
	B	Terminologies used in Cryptography, Substitution Techniques, Transposition Techniques.		CO5, CO6, CO3
	C	Characteristics of Good Encryption Technique, Properties of Trustworthy Encryption Systems, Types of Encryption Systems, Confusion and Diffusion, Cryptanalysis.		CO6, CO4, CO2
	Unit 2	**Encryption**		
	A	Data Encryption Standard (DES) Algorithm, Double and Triple DES, Security of the DES		CO1,CO2. CO3
	B	Advanced Encryption Standard (AES) Algorithm, DES and AES Comparison.		CO4,CO5,CO6
	C	Characteristics of Public Key System, RSA Technique, Key Exchange, Diffie-Hellman Scheme, Cryptographic Hash Functions, Digital Signature, Certificates, Certificate Authorities.		CO1,CO6, CO3, CO4

	Unit 3	**Security**	
	A	Secure Programs, Non-malicious Program Errors, Viruses and Other Malicious Code, Targeted Malicious Code, Methods of Control.	CO1,CO2, CO4
	B	Objects to be Protected, Protection Methods of Operating Systems	CO6, CO3,CO1
	C	Memory Protection, File Protection, User Authentication.	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, Encryption for Secure E-Mail, 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	
		30% / 20% / 50%	
	Text book/s*	1. John E. Canavan, " The Fundamentals of Network Security," Artech House, February 2001, 350 pages. Handbook of Information Security, HosseinBidgol	
	Other References		

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program 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 MCT215)

Course Code_ Course Name	CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2
(MCT-215)	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***

Syllabus: MCA 365 SOFTWARE PROJECT MANAGEMENT

School:	**School of Engineering and technology**
Department	**Department of Computer Science and Engineering**

Program:		**MSc**		
Branch:		**NA**		
1	Course Code	MCA 365	Semester-III	
2	Course Title	**Software Project Management**		
3	Credits	3		
4	Contact Hours (L-T-P)	3-0-0		
	Course Status			
5	Course Objective	To provide fundamental skills of software Project management emphasizing on issues & hurdles associated with delivering successful projects. Apply project management concepts through working in a group as team leader or active team member on an IT project.		
6	Course Outcomes	After successful completion of this course students should be able to: CO1: Define the principles of project management for developing software. CO2: Explain various project management scheduling techniques. CO3: Apply different techniques of project monitoring, control and review. CO4: Classify various project management tools and estimate the risks involved in project activities. CO5: Assess issues related to project quality and staffing. CO6: Discuss the effect of project management practices in an organization		
7	Course Description	This course is aimed at introducing the primary important concepts of project management related to managing software development projects. Students will also get familiar with the different activities involved in Software Project Management. Further, they will also come to know how to successfully plan and implement a software project management activity, and to complete a specific project in time with the available budget.		
8	Outline syllabus			CO Mapping
	Unit 1	**Introduction to Software Project Planning**		
	A	Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope Document, Project Management Cycle, SPM Objectives		CO1
	B	SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of Project Plan, Structure of a Software Project Management Plan		CO1
	C	Software Project Estimation, Estimation Methods, Estimation Models, Decision Process		CO1
	Unit 2	**Project Organization and Scheduling Project Elements**		
	A	Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle		CO2
	B	Ways to Organize Personnel, Project Schedule, Scheduling Objectives, Building the Project Schedule, Scheduling Terminology and Techniques		CO2
	C	Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts		CO2
	Unit 3	**Project Monitoring and Control**		
	A	Dimensions of Project Monitoring & Control, Earned		CO3, CO6

		Value Analysis			
	B	Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI)			CO3
	C	Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews			CO3
	Unit 4	**Software Configuration and Risk Management**			
	A	Software Configuration Items and Tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control			CO4
	B	Risk Management: Risks and Risk Types, Risk Breakdown Structure (RBS), Risk Management Process: Risk Identification, Risk Analysis, Risk Planning, Risk Monitoring			CO4, CO6
	C	Cost Benefit Analysis, Software Project Management Tools: CASE Tools, MS-Project			CO4, CO6
	Unit 5	**Software Quality Assurance**			
	A	Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model (CMM)			CO5, CO6
	B	SQA Activities, Formal SQA Approaches: Proof of Correctness, Statistical Quality Assurance, Product versus process quality management,			CO5
	C	Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance			CO5, CO6
	Mode of examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. Software Project Management, Bob Hughes and Mike Cotterell, McGraw Hill			
	Other References	1. Software Project Management A Unified Framework, Walker Royce, Addison-Wesley 2. A practitioner's Guide to Software Engineering, Roger Pressman, Tata McGraw Hill 2014 8th edition. 3. Basics of Software Project Management, NIIT, Prentice-Hall India, Latest Edition.			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Define the principles of project management for developing software.	PO1,PO2,PO3, PO7,PO8,PO9,PO10
2.	CO2: Explain various project management scheduling techniques.	PO1,PO2,PO3,PO4, PO7,PO8,PO9,PO10
3.	CO3: Apply different techniques of project monitoring, control and review.	PO1,PO2,PO3,PO4, PO7,PO8,PO9,PO10
4.	CO4: Classify various project management tools and estimate the risks	PO1,PO2,PO3,PO4, PO7,PO8,PO9,PO10

	involved in project activities.	
5.	CO5: Assess issues related to project quality and staffing.	PO1,PO2,PO3, PO7,PO8,PO9,PO10
6.	CO6: Discuss the effect of project management practices in an organization	PO1,PO2,PO3,PO5,PO6,PO7,PO8,PO9, PO10,PSO1

PO and PSO mapping with level of strength for Course Name Software project management(Course Code MCA 365)

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
MCA 365_Software project management	CO1	3	1	1	-	-	-	1	3	3	2	-	-
	CO2	3	3	3	3	-	-	2	3	3	2	-	-
	CO3	3	3	3	3	-	-	2	3	3	2	-	-
	CO4	3	3	3	3	-	-	2	3	3	2	-	-
	CO5	3	1	3	-	-	-	2	3	3	2	-	-
	CO6	3	2	3	-	2	2	2	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
MCA 365	Software project management	3	2.1	2.6	3	2	2	1.8	3	3	3	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***

MCT216: Software Engineering & Testing

School:		**School of Engineering and Technology**		
Department		**Department of Computer Science and Engineering**		
Program:		Msc		
Branch:		CS		
1	Course Code	MCT216		
2	Course Title	Software Engineering & Testing		
3	Credits	3		
4	Contact Hours (L-T-P)	3-0-0		

	Course Status		
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	CO3

		independence, Cohesion, Coupling, Design documentation			
	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	
		30%	20%	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	Program Outcomes (PO) & Program 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** MCT216**)**

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
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
MCT216	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: SET		**Batch :** 2021-2022	
Program:		**Academic Year:** 2021-2022	
Branch: CSE		**Semester:** V	
1	Course Code	ARP 305	Course Name : Personality Development and Decision making Skills
2	Course Title	Personality Development and Decision making Skills	
3	Credits	2	
4	Contact	1-0-2	

	Hours (L-T-P)	
	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	Outline 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 | Verbal Abilities-3	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
	Weightage Distribution	*(CA)Class Assignment/Free Speech Exercises / JAM – 60% | (ETE) Group Presentations/Mock Interviews/GD/ Reasoning, Quant & Aptitude – 40%*	
	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	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PS O1	PSO 2	PSO 3
ARP305.1	-	-	-	-	-	1	-	-	1	2	1	2	-	-	-
ARP305.2	-	-	-	-	-	1	-	-	1	2	1	2	-	-	-
ARP305.3	-	-	-	-	-	-	-	-	1	2	1	2	-	-	-
ARP305.4	1	-	-	-	-	-	-	-	1	2	1	2	-	-	-
ARP305.5	1	-	-	-	-	-	-	-	1	2	1	2	-	-	-
ARP305.6	1	-	-	-	-	-	-	-	1	2	1	2	-	-	-

Computer Graphics and Animation Lab

School: SET		**Batch : 2021 onwards**	
Program: MSc		**Current Academic Year:2021**	
Branch: CS		**Semester: III**	
1	**Course Code**	MCL213	
2	**Course Title**	**Computer Graphics and Animation Lab**	
3	**Credits**	**1**	
4	**Contact Hours (L-T-P)**	**0-0-2**	
	Course Status	**Core**	
5	Course Objective	The main objective of this course is to acquaint students with the practical applicability of computer graphics and animation. They should be able to perform 2D -3D graphics with lines, curves and can implement algorithms to rasterizing simple shapes, fill and clip polygons and have a basic grasp of transformation techniques. It also include problems to develop storyboards and 2-dimentional animation including creating, importing and sequencing media elements.	
6	Course Outcomes	Students will be able to have thorough Understanding of: **CO1:** ***Examine*** the need of developing graphics application. **CO2:** ***Build*** algorithmic development of graphics primitives like: line, circle, polygon etc. **CO3:** ***Develop*** programs for representation and transformation of graphical images and pictures. **CO4:** ***Apply*** basic transformations on objects **CO5:** ***Demonstrate*** progress in basic drawing and animation skills **CO6:** ***Create*** accurate and aesthically appealing basic animation	
7	Course Description	This course introduces practical applicability of interactive computer graphics and drawing algorithms. Along with fundamental skills to produce traditional style animation as well as knowledge of the principles of animation.	
8	Outline syllabus		CO Mapping
	1	Write a program to draw a line using DDA algorithm	CO1, CO2
	2	Write a program to draw a line using Bresenham‘s algorithm.	CO1, CO2
	3	Write a program to draw a circle using midpoint algorithm.	CO1, CO2, CO3
	4	Write a program to draw a circle using Bresenham‘s algorithm.	CO1, CO2, CO3
	5	Write a program to draw a rectangle using line drawing algorithm.	CO1, CO2, CO3
	6	Write a program to perform 2D Transformation on a line.	CO3, CO4
	7	Write a program to perform shear transformation on a rectangle.	CO3, CO4
	8	Write a program to rotate a circle (alternatively inside and outside) around the circumference of another circle.	CO3, CO4
	9	Write a program to draw a car using in	CO3, CO4

		build graphics function and translate it from bottom left corner to right bottom corner of screen.			
	10	Write a program to draw balloons using in build graphics function and translate it from bottom left corner to right top corner of screen.			CO3, CO4
	11	Write a program to implement line clipping (Cohen Sutherland algorithm).			CO3, CO4, CO5
	12	Write a program for making Bezier curve			CO3, CO4, CO5
	13	Write a program to study various in built functions for 2D drawing in MAYA software.			CO5, CO6
	14	Write a program to show animation of a ball moving in a helical path			CO5, CO6
	15	Write a program to show animation of solar system.			CO5, CO6
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*				
	Reference Books	1. Interactive Computer Graphics A Top-Down Approach with OpenGL, Edward Angel, Pearson, 2. Malay K. Pakhira, Computer Graphics, Multimedia and Animation, PHI			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Examine the need of developing graphics application.	PO1, PO2, PO3, PO4, PO7, PO9, PO10, PSO1, PSO2
2.	CO2: Build algorithmic development of graphics primitives like: line, circle, polygon etc.	PO1, PO2, PO3, PO4, PO10, PSO1, PSO2
3.	CO3: Develop programs for representation and transformation of graphical images and pictures.	PO1, PO2, PO3, PO4, PO5, PO8, PO10, PSO1, PSO2
4.	CO4: Apply basic transformations on objects	PO1, PO2, PO3, PO4, PO6, PO10, PSO1, PSO2
5	CO5: Demonstrate progress in basic drawing and animation skills	PO1, PO2, PO3, PO4, PO5, PO6, PO10, PSO1, PSO2
6	CO6: Create accurate and aesthically appealing basic animation	PO1, PO2, PO3, PO4, PO5, PO6, PO8,PO9, PO10, PSO1, PSO2

PO and PSO mapping with level of strength

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

CO4	1	2	1	3	-	1	-	-	-	1	2	3
CO5	2	2	2	2	-	2	-	-	-	1	1	2
CO6	2	3	2	3	2	2	-	2	2	2	1	1
	1.7	2.2	1.8	2.0	1.5	1.7	2.0	1.5	1.5	1.7	1.8	1.7

School: SET		**Batch : 2021**			
Program: MSc		**Current Academic Year: 2021-22**			
Branch:CS		**Semester: III**			
1	Course Code	MCL214	Course Name: MSC		
2	Course Title	Web and its Applications Lab			
3	Credits	1			
4	Contact Hours (L-T-P)	0-0-2			
	Course Status	Compulsory			
5	Course Objective	Provide the knowledge to design and develop web application with and without database. Students will gain the skills and project-based experience needed for entry into web application and development careers.			
6	Course Outcomes	CO1: Design interactive web pages using HTML5 and Javascript CO2: Demonstrate the concept of servlets CO3: Develop the dynamic website using JSP CO4: Examine the requirement of Jquery and Ajax CO5: Determine the concept of RMI and networking. CO6: Develop a dynamic website using Jsp, servlet Jquery , Ajax, etc.			
7	Course Description	This course is an overview of the modern Web technologies used for the Web development. The purpose of this course is to give students the basic understanding of how things work in the Web world from the technology point of view as well as to give the basic overview of the different technologies.			
8	Outline syllabus				CO Mapping
	Unit 1	**INTRODUCTION TO HTML & JAVA SCRIPT**			
		Program related to Html and Java Script			CO1
	Unit 2	**Servlets & ENTERPRISE JAVA BEANS**			
		Program related to Servlet			CO2
	Unit 3	**JAVA SERVER PAGES**			
		Program related to Java server pages.			CO3
	Unit 4	**Jquery& AJAX**			
		Program related to Jquery and Ajax			CO4
	Unit 5	**RMI AND JAVA NETWORKING**			
		Program related to client server programming and RMI			CO5, CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. Ivan Bayross,"HTML,DHTML, JavaScript, Perl & CGI", BPB Publication 2. Schildt H, "The Complete Reference JAVA2", TMH 3. Schildt H, "The Complete Reference J2EE", TMH			
	Other References	1. Rick Delorme," Programming in HTML5 with JavaScript and CSS3", Microsoft			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Design interactive web pages using HTML5 and Javascript	PO4,PO12
2.	CO2: Demonstrate the concept of servlets	PO4
3.	CO3: Develop the dynamic website using JSP	PO4,PO12,PSO1,PSO2
4.	CO4: Examine the requirement of Jquery and Ajax	PO4
5.	CO5: Determine the concept of RMI and networking.	PO4
6.	CO6: Develop a dynamic website using Jsp, servlet Jquery , Ajax, etc.	PO1,PO2,PO3,PO4 ,PO9,PO11,PO12,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Web and its Applications (Course Code MCL214)

Course Code_ Course Name	CO's	PO1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
MCL214 Web and Its Application Lab	CO1				2								2		
	CO2				2										
	CO3				2								2	2	3
	CO4				2										
	CO5				2										
	CO6	3	3	3	3					3		2	3	3	3

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	PO 11	PO 12	PSO1	PSO2
MCL214	Web and its Applications Lab	3	3	3	2.16					3		2	2.33	2.5	3

Strength of Correlation

1. Addressed to***Slight (Low=1)extent2.*** Addressed to***Moderate (Medium=2) extent***
3. Addressed to***Substantial (High=3) extent***

School: SET	Batch : 2021-23

Program: MSc		**Current Academic Year: 2021**			
Branch: Cs		**Semester: IIIrd**			
1	**Course Code**	**MCL354**			
2	**Course Title**	**SEMINAR**			
3	**Credits**				
4	**Contact Hours (L-T-P)**				
	Course Status	**PG**			
5	Course Objective	The students will be identifying relevant information, defining and explaining topic chosen for seminar. Students will apply theories, methods and knowledge bases from multiple fields to a single question or problem.			
6	Course Outcomes	Students will be able : CO1: Develop the ability for independent learning and acquiring knowledge. CO2: Identify and discuss domain specific problems. CO3: Choose a multidisciplinary strategy to address real-world issues. CO4: Apply principles of ethics and respect while interaction with others. CO5: Demonstrate the ability to participate effectively in discussions. CO6: Improve oral and written communication skills.			
7	Course Description	This is a 4-credit course aimed at teaching 2nd year MCA students to make research presentations. Each student has to choose a paper / topic related to Computer Science and Engineering. It need not be related to the Mtech project. A detailed literature review of a specific research problem. This can include: background related to the problem, categorization of approaches, specific approaches, etc.			
8	Outline syllabus				
	Each student has to choose a paper / topic related to Computer Science and Engineering. It need not be related to the MCA project. A detailed literature review of a specific research problem. This can include: background related to the problem, categorization of approaches, specific approaches, etc. Guidelines/Suggestions on how to prepare a good talk will be made by MCA coordinator.				
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Develop the ability for independent learning and acquiring knowledge.	PO1,PO2,PO3,PO4,PO8
2.	CO2: Identify and discuss domain specific problems.	PO1,PO2,PO3,PO8,PSO1,PSO2,PSO3
3.	CO3: Choose a multidisciplinary strategy to address real-world issues.	PO1,PO2,PO3,PO4,,PO8,PSO1,PSO2,PSO3
4.	CO4: Apply principles of ethics and respect while interaction with others.	PO3,PO5,PO6,PO7,PO8

5	CO5: Demonstrate the ability to participate effectively in discussions.	PO1,PO3,PO4,PO7,PO8
6	CO6: Improve oral and written communication skills.	PO1,PO3,PO4,PO6,PO7,PO8

CO/PO-PSO Mapping

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Low

Course Objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	2	2	2	-	1	-	-	-	1	-	2	1
CO2	1	2	2	-	1	2	-	-	3	2	2	2
CO3	2	2	2	3	2	2	-	-	2	2	2	2
CO4	-	-	3	-	-	-	3	-	-	2	2	-
CO5	1	-	1	-	-	-	3	3	-	2	2	-
CO6	1	-	1	-	-	-	3	3	-	2	2	-
Avg PO attained	1	1	1.8	0.5	0.7	0.7	1.5	1	1	2	2	1

Branch: CS		Semester: III			
1	Course Code	**MCL295**			
2	Course Title	Project-1 (MSc)			
3	Credits	1			
4	Contact Hours (L-T-P)	0-0-2			
	Course Status	Compulsory			
5	Course Objective	The objective of this course is to let the students apply the programming knowledge into a real- world situation/problem.			
6	Course Outcomes	Students will able to: CO1: Analyze a given problem; define its requirements and specifications appropriate to its solution. CO2: Apply prior knowledge to designing and implementing solutions to problems using advanced programming techniques. CO3: Analyze and make use of modern tools and packages in efficient manner./ reuse- or integrate with- existing components CO4: Apply techniques of software verification and validation of project successfully. CO5: Deduce and conclude effective time and project management techniques. CO6: Effectively elaborate and communicate the project work in written and oral forms using appropriate different visualization tools and evaluation metrics.			
7	Course Description	This course will consist of the work on the topic selected for the minor project .The project must be done in a group not exceeding four students. The candidate is expected to select the project, do the requirements analysis, and carry out the necessary design procedure.			
8	Outline syllabus				CO Mapping
	Unit 1	Problem Definition, Team/Group formation and Project Assignment. Finalizing the problem statement, resource requirement, if any			CO1,CO6
	Unit 2	Develop a work flow or block diagram for the proposed system / software, Design algorithms for the proposed problem.			CO2
	Unit 3	Implementation of work under the guidance of a faculty member and obtain the appropriate results.			CO3,CO6,
	Unit 4	Demonstrate and execute Project with the team. Test the project modules.			CO4,CO6
	Unit 5	Report should include Abstract, Hardware / Software Requirement, Problem Statement, Design/Algorithm, Implementation Detail & Test Reports. References if any. The presentation, report, work done during the term supported by the documentation, forms the basis of assessment.			CO5,CO6
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	NA	40%	
	Text book/s*				
	Other References				

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO)
1.	CO1: Analyze a given problem; define its requirements and specifications appropriate to its solution.	**PO1,PO2,PO3, PSO1,PSO2**
2.	CO2: Apply prior knowledge to designing and implementing solutions to problems using advanced programming techniques.	**PO1,PO2,PO3,PO4,PO5,PO10,PSO1,PSO2**
3.	CO3: Analyze and make use of modern tools and packages in efficient manner./ reuse- or integrate with- existing components	**PO1,PO2,PO3,PO4, ,PSO1,PSO2**
4.	CO4: Apply techniques of software verification and validation of project successfully.	**PO1,PO2,PO3,PO4,PO5,PO12,PSO1,PSO2**
5.	CO5: Deduce and conclude effective time and project management techniques.	**PO1,PO4,PO5,PO9,PO10, PSO1,PSO2**
6.	CO6: Effectively elaborate and communicate the project work in written and oral forms using appropriate different visualization tools and evaluation metrics.	**PO4,PO5,PO8,PO10,PSO1,PSO2**

PO and PSO mapping with level of strength for Course Name: Project-1 (MSc)-MCL295

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	2	3	-	-	-	-	-	-	-	1	2
CO2	2	2	3	2	-	-	-	-	-	2	1	2
CO3	1	2	2	3	-	-	-	-	-	-	1	2
CO4	1	2	1	1	1	-	-	-	-	-	1	2
CO5	2	-	-	1	1	-	-	-	3	2	1	2
CO6	-	-	-	2	1	-	-	3	-	2	2	3
Avy PO attained	2	1.3	1.5	1.5	0.5	0	0	0.5	1	1	1	2

TERM-IV

Syllabus: MCL296, Project - 2

School: SET		**Batch:**			
Program: MSc		**Current Academic Year:**			
Branch: CS		**Semester:**			
1	Course Code	**MCL296**	Course Name: Project -2		
2	Course Title	Project -2			
3	Credits				
4	Contact Hours (L-T-P)				
	Course Status	Compulsory			
5	Course Objective	1. To understand the concept of project design after the completion of project planning 2. Students making decisions within a framework 3. Continuous evaluation of the project 4. A final product to be evaluated for quality			
6	Course Outcomes	Students will be able to: CO1: Demonstrate the implementation of the project. CO2: Identify the test procedure for each implemented module. CO3: Deploy and evaluate the modules to verify the required need of the project. CO4: Use different tools for testing and report writing. CO5: Develop the attitude and ethics of a professional engineer. CO6: Communicate project work effectively with at large in written and oral forms, preferably research paper/patent/technical competitions, as a part of the project work.			
7	Course Description	The objective of Major Project-II is to enable the student to extend further the development of project till testing and deployment under the guidance of a Supervisor.			
	Mode of examination	Practical			
	Weight age Distribution	CA			MTE
		60%	NA	ETE	
	Text book/s*			40%	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO)
1.	CO1: Demonstrate the implementation of the project.	PO1,PO2,PO3,PO4,PO9,PO10,PSO1,PSO2
2.	CO2: Identify the test procedure for each implemented module.	PO1,PO3,PO4,PO9,PO10,PSO1,PSO2
3.	CO3: Deploy and evaluate the modules to verify the required need of the project.	PO1,PO2,PO3,PO4,PO6,PO9,PO9,PSO1,PSO2
4.	CO4: Use different tools for testing and report writing.	PO1,PO4,PO8,PSO1,PSO2

5.	CO5: Develop the attitude and ethics of a professional engineer.	PO6,PO7,PSO1,PSO2
6.	CO6: Communicate project work effectively with at large in written and oral forms, preferably research paper/patent/technical competitions, as a part of the project work.	PO1,PO2,PO7,PO8,PO9,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Project -2 (Course Code MCL296)

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

1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)