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
2019-20

Program and Course Structure
M.Sc (Computer Science)
2019 ADMISSION BATCH

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**

Creative Campaign Can be TEDs: This is guiding principle for promotion and wide circulation among various stakeholder.
Guidelines: Similar Mnemonics can be designed by schools.

Core Values

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

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

1.2 Vision and Mission of the School

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 counselling.**

1.2.1Vision and Mission of the Department

Vision of the Department

To be known and recognized as the fountainhead of excellence in technical knowledge and research in computer science and engineering, and draw to it the students and scholars across nations.

Mission of the Department

1. To facilitate and foster the academia industry collaboration to enhance entrepreneurship skills and acquaintance with corporate culture.
2. To strengthen core competences of students to be successful, ethical , effective problem solver in Computer Science & Engineering through analytical learning
3. To promote research based activities in emerging areas of technology convergence.
4. To induce moral values and spirit of social commitment.

1.3 Programme Educational Objectives (PEO)

1.3.1 Writing Programme Educational Objectives (PEO)

The Educational Objectives of PG Program in Computer Science Engineering are:

PEO1 : The Graduate will ensconce himself/herself as effective professionals by solving real life problems using exploratory and analytical skills along with the knowledge acquired in the field of Computer Science and Engineering.

PEO2 : The Graduate will demonstrate his/her ability to accustom to rapidly changing environment in advanced areas of Computer Science and scale new height in their profession through lifelong learning.

PEO3 : The Graduate will have the ability to work and communicate effectively as a team member or leader to complete the task with minimal resources, meeting deadlines.

PEO4 : The Graduate will embrace professional code of ethics in the profession while deliberately being part of projects which contributes to the society at large without disturbing the ecological balance.

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 School Mission Statements:

PEO Statements	School Mission 1	School Mission 2	School Mission 3	School Mission 4
PEO1:	**3**	**3**	**2**	**2**
PEO2:	**2**	**3**	**2**	**1**
PEO3:	**2**	**2**	**2**	**3**
PEO4:	**2**	**1**	**3**	**1**

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 "-"

1.3.2.1 Map PEOs with Department Mission Statements:

PEO Statements	Department Mission 1	Department Mission 2	Department Mission 3	Department Mission 4
PEO1:	**2**	**3**	**2**	**1**
PEO2:	**1**	**3**	**3**	**1**
PEO3:	**3**	**2**	**1**	**1**
PEO4:	**1**	**2**	**2**	**3**
PEO5:	**2**	**3**	**2**	**1**

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: Apply algorithmic, mathematical and scientific reasoning to a variety of computational problems
PO2: Design, correctly implement and document solutions to significant computational problems
PO3: Analyse and compare alternative solutions to computing problems
PO4: Implement software systems that meet specified design and performance requirements
PO5: Work effectively in teams to design and implement solutions to computational problems
PO6: Communicate effectively, both orally and in writing
PO7: Recognize the social and ethical responsibilities of a professional working in the discipline

PSO1: To Apply algorithmic reasoning to a variety of computational problems
PSO2: To Design, correctly implement and document solutions to significant computational problems
PSO3: To Implement software systems that meet specified design and performance requirements
PSO4: To Work effectively in teams to design and implement solutions to computational problems
PSO5: To Communicate effectively, both orally and in writing

.

1.3.4 Mapping of Program Outcome Vs Program Educational Objectives

Mapping	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	3	2	2	1	1
PO2	3	3	3	2	2
PO3	1	2	2	3	2
PO4	3	1	3	3	3
PO5	2	3	2	3	1
PO6	1	2	3	2	2
PO7	3	2	1	3	3

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

School of Engineering and Technology							
M.Sc in Computer Science							
Batch: 2019 Onwards						TERM: I	
S. No.	**Course Code**	**Course**	**Teaching Load**			**Credits**	**Pre-Requisite/Co Requisite**
			L	**T**	**P**		
THEORY SUBJECTS							
1	MCT101	C Programming	3	1	0	4	
2	MCT102	Digital Electronics	3	0	0	3	
3	MCT108	Operating System Concept	3	0	0	3	
4	MMT229	Introduction to MATLAB and its Applications	2	1	0	3	
Practical/Viva-Voce/Jury							
5	ARP101	Communicative English-1	1	0	2	2	
6	MCL101	C Programming Lab	0	0	2	1	
7	MCL102	Digital Electronics Lab	0	0	2	1	
8	MCL108	Operating System Concept Lab	0	0	2	1	
TOTAL CREDITS						**18**	

School of Engineering and Technology							
M.Sc in Computer Science							
Batch: 2019 Onwards						TERM: II	
S. No.	**Course Code**	**Course**	**Teaching Load**			**Credits**	**Pre-Requisite/Co Requisite**
			L	**T**	**P**		
THEORY SUBJECTS							
1	MCT104	Object oriented programming with JAVA	3	1	0	4	
2	MCT105	Computer Organization and Architecture	3	0	0	3	
3	MCT106	Data Structures	3	1	0	4	
4	MMT123	Numerical Methods with Programming	4	0	0	4	
5	MCT107	System Analysis and Design	3	0	0	3	
Practical/Viva-Voce/Jury							
6	ARP102	Communicative English -2	1	0	2	2	
7	MCL104	Object oriented programming with JAVA Lab	0	0	2	1	
8	MCL106	Data Structure Lab	0	0	2	1	
TOTAL CREDITS						**22**	

School of Engineering and Technology							
M.Sc in Computer Science							
Batch: 2019 Onwards						TERM: III	
S. No.	**Course Code**	**Course**	**Teaching Load**			**Credits**	**Pre-Requisite/Co Requisite**
			L	**T**	**P**		
THEORY SUBJECTS							
1	MCT201	Programming in Python	3	0	0	3	
2	MCT202	Introduction to Computer Networks	3	0	0	3	
3	MCT203	Principles of Database Management Systems	3	0	0	3	
4		Programme Elective-I	3	0	0	3	
	MCT209	Introduction to Graph Theory and its applications					
	MCT210	Software Project Management					
5	MCT204	Software Engineering	3	0	0	3	
Practical/Viva-Voce/Jury							
6	ARP203	Logical Skills Building and Soft Skills	1	0	2	2	
7	MCL201	Programming in Python	0	0	2	1	
8	MCL202	Introduction to Computer Networks Lab	0	0	2	1	
9	MCL203	Principles of Database Management Systems Lab	0	0	2	1	
TOTAL CREDITS						**20**	

School of Engineering and Technology							
M.Sc in Computer Science							
Batch: 2019 Onwards						TERM: IV	
S. No.	**Course Code**	**Course**	**Teaching Load**			**Credits**	**Pre-Requisite/Co Requisite**
			L	**T**	**P**		
THEORY SUBJECTS							
1	MCT205	Design and analysis of algorithms	3	1	0	4	
2		Programme Elective-II	3	0	0	3	
	MCT211	Advanced Database Management Systems					
	MCT212	Mobile Technologies					
3		Programme Elective-III	3	0	0	3	
	MCT213	Data Mining & Knowledge discovery					
	MCT214	Cloud Computing					
4	MCT208	Artificial Intelligence	3	0	0	3	
Practical/Viva-Voce/Jury							
5	ARP204	Quantitative and Qualitative Aptitude Sill Building	1	0	2	2	
6	MCL205	Design and analysis of algorithms Lab	0	0	2	1	
7	MCL208	Artificial Intelligence Lab	0	0	2	1	
8	MCT207	Project	0	0	6	3	
TOTAL CREDITS						**20**	

MSC(CS) PE-1		MSC(CS) PE-2		MSC(CS) PE-3	
MCT209	Introduction to Graph Theory and its applications	MCT211	Advanced Database Management Systems	MCT213	Data Mining & Knowledge discovery
MCT210	Software Project Management	MCT212	Mobile Technologies	MCT214	Cloud Computing

Course Modules

Semester I

School: SET		**Batch : 2019**	
Program: M Sc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: I**	
1	Course Code	**MCT 101** Course Name: C Programming	
2	Course Title	C Programming	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status	PG	
5	Course Objective	1. Learn basic programming constructs –data types, decision structures, control structures in C 2. learning logic aptitude programming in c language 3. Developing software in c programming	
6	Course Outcomes	Students will be able to: CO1: Understand core concept of c Programming CO2: Implement Array and String CO3: Implement Functions CO4: Use Union and Structure CO5: Understand and implement Pointers	
7	Course Description	Programming for problem solving gives the Understanding of C programming and implement code from flowchart or algorithm	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to C Programming**	
	A	Introduction to C programming language, Data types, Variables, Constants, Identifiers and keywords,	CO1,
	B	Storage classes Operators and expressions, Types of Statements: Assignment, Control, jumping.	CO1
	C	Control statements: Decisions, Loops, break, continue	CO1
	Unit 2	**Arrays and Strings**	
	A	Arrays: One dimensional and multi-dimensional arrays:	CO2
	B	Declaration, Initialization and array manipulation (sorting, searching).	CO2
	C	Strings, String operations, String Functons	CO2
	Unit 3	**Functions**	
	A	Functions: Definition, Declaration/Prototyping and Calling, Types of functions	CO3
	B	Parameter passing: Call by value, Call by reference.	CO3
	C	Passing and Returning Arrays from Functions, Recursive Functions.	CO3

	Unit 4	**Structure and Unions**			
	A	Structure and Unions: Introduction, Declaration, Difference, Application,			CO4
	B	Nested structure, self-referential structure,			CO4
	C	Array of structures, Passing structure in function			CO4
	Unit 5	**Pointers &File Handling**			
	A	Pointer: Introduction, declaration of pointer variables, Operations on pointers:			CO5
	B	Pointer arithmetic, Arrays and pointers, Dynamic memory allocation. List and Queue			CO5
	C	Files: Introduction, concept of record, I/O Streaming and Buffering, Types of Files: Indexed file, sequentialfile and random file			CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	Kernighan, Brian, and Dennis Ritchie. *The C Programming Language*			
	Other References	1. B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004. 2. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Understand core concept of c Programming	PO1,PO2,PO3,PO11,PO12 PSO1,PSO2,PSO3,PSO4,SPO5
2.	CO2: Implement Array and String	PO1,PO2,PO3,PO11,PO12 PSO1,PSO2,PSO3,PSO4,SPO5
3.	CO3: Implement Functions	PO1,PO2,PO3,PO11,PO12 PSO1,PSO2,PSO3,PSO4,SPO5
4.	CO4: Use Union and Structure	PO1,PO2,PO3,PO11,PO12 PSO1,PSO2,PSO3,PSO4,SPO5
5.	CO5: Understand and implement Pointers	PO1,PO2,PO3,PO11,PO12 PSO1,PSO2,PSO3,PSO4,SPO5

PO and PSO mapping with level of strength for Course Name C Programming

	Cos	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	PSO 4	PSO 5
CSE107	CO 1	3	2	3	-	-	-	-	-	-	-	2	1	3	2	2	1	2
	CO 2	3	2	3	-	-	-	-	-	-	-	2	1	3	2	2	1	2
	CO 3	3	2	3	-	-	-	-	-	-	-	1	1	2	3	2	1	2
	CO 4	3	2	3	-	-	-	-	-	-	-	3	2	3	2	1	1	1
	CO 5	3	2	3	-	-	-	-	-	-	-	3	1	2	2	2	1	3

School: SET		**Batch : 2019**	
Program: M Sc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: I**	
1	Course Code	MCL101	
2	Course Title	C Programming Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	1. Learn basic programming constructs –data types, decision structures, control structures in C 2. learning logic aptitude programming in c language 3. Developing software in c programming	
6	Course Outcomes	Students will be able to: CO1: Understand core concept of c Programming CO2: Implement Array and String CO3: Implement Functions CO4: Use Union and Structure CO5: Understand and implement Pointers	
7	Course Description	Programming for problem solving gives the Understanding of C programming and implement code from flowchart or algorithm	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to C Programming**	**CO1**
		Write a c program to swap two numbers	
		Write a c Program to Add Two Integers	
		Write a program to check given year is leap year	CO1
		Write a c program to find GCD of two numbers	
	Unit 2	**Arrays and Strings**	**CO1, CO2**
		Write a c program to calculate the average using arrays	
		Write a c program to find the largest element of the array	
		Write a c program to add two matrix	
		Write a c program to concatenate two strings	
	Unit 3	**Functions**	**CO1, CO2**
		Write a c program to create a function to count number of vowels in a string	
		Write a function to calculate factorial of a number	**CO1, CO2**
		Write a recursive function for Fibonacci series	**CO1, CO2**
	Unit 4	**Structure and Unions**	**CO3, CO5**
		Write a c program to store information of a student using structure	
		Write a c program to store information of a student using union	CO3, CO5
	Unit 5	**Pointers &File Handling**	**CO4**
		Write a c program to swap two values using pointers	
		Write a c program to store information of a student in a file	CO4
	Mode of	Practical	

	examination				
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	Kernighan, Brian, and Dennis Ritchie. *The C Programming Language*			
	Other References	1. B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004. 2. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999			

Course outline

This course implements array and pointer and Recursive applications. The course talks primarily about Array, string, functions, structure & union and Pointers etc.

Course Evaluation	
Attendance	None
Any other	CA judged on the practicals conducted in the lab , weightage may be specified
References	
Text book	Kernighan, Brian, and Dennis Ritchie. *The C Programming Language*
Other References	1. B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004. 2. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999
Softwares	Turbo C

School: SET		**Batch :2019**	
Program: M Sc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: 1**	
1	Course Code	MCT 102	Course Name: Digital Electronics
2	Course Title	**Digital Electronics**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	1. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits. 2. To prepare students to perform the analysis and design of various digital electronic circuits	
6	Course Outcomes	Students will be able to: **CO1:**Have a thorough understanding of the fundamental concepts and techniques used in digital electronics. **CO2:**The ability to understand, analyze and design various combinational and sequential circuits. **CO3:**The ability to identify and prevent various hazards and timing problems in a digital design **CO4:**To develop skill to build, and troubleshoot digital circuits.	
7	Course Description	Digital Electronics (DE) is the study of electronic circuits that are used to process and control digital signals as opposed to analog signals that are varying. This distinction allows for greater signal speed and storage capabilities and has revolutionized the world electronics. Digital electronics is the foundation of all modern electronic devices such as cellular phones, MP3 players, laptop computers, digital cameras, high definition televisions, etc.	
8	Outline syllabus		CO Mapping
	Unit 1	**Digital Logic Circuits**	
	A	Introduction to digital signals, one's complement and two's complement, Binary	CO1,CO2
	B	Arithmetic Basic gates(AND,OR,NOT), other gates (NAND,NOR,XOR, XNOR), Universal gates,	CO1,CO2
	C	Implementation of Universal gates using basic gates , De-Morgan's Theorem : Statement and Proof	CO1,CO4
	Unit 2	**Boolean Algebra**	
	A	Boolean Laws, Simplification of Boolean expression using Laws,	CO1,CO2
	B	Min terms (SOP) Ma x terms (POS), Standard/Canonical SOP and POS forms	CO1,CO2

	C	Kmap(2,3 and 4 variable s), Don't care conditions			CO1,CO2
	Unit 3	**Combinational circuits**			
	A	Introduction to combinational circuits, Adder: Half & Full, subtractor: Half & Full			CO1,CO2
	B	Multiplexer (4 to 1,8 to 1 ,16 to 1), Demultiplexer(1 to 4, 1 to 8,1 to 16,			CO1,CO2
	C	Decoder(1 of 4,1 of 8, 1 of 16), encoder(decimal to BCD, hexadecimal to BCD)			CO1,CO2
	Unit 4	**Sequential Circuits**			
	A	What is sequential circuits? Flip flop: SR flip Flop (NAND and NOR), clocked SR,			CO1,CO2,CO3,CO4
	B	D Flip flop, JK Flip Flop, T Flip Flop			CO1,CO2,CO3,CO4
	C	Registers: buffer register, shift left register, shift right register, applications			CO1,CO2,CO3,CO4
	Unit 5	**Counters**			
	A	Counters,need of counter,types-synchronous & asynchronous, counter applications			CO1,CO2,CO3,CO4
	B	Ripple counter,synchronous counter			CO1,CO2,CO3,CO4
	C	ring counter,BCD counter			CO1,CO2,CO3,CO4
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. Modern Digital Electronics by R. P. Jain, 3rd Edition, McGraw Hill			
	Other References	1. Digital Design and Computer Organisation by Dr. N. S. Gill and J. B. Dixit, University Science Press 2. Digital computer electronics by Malvino& Brown, Third Edition-TMH Publications 3. Digital Principles and Applications by Malvino and Leach, TMH Publications			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:** Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.	PEO1,PEO2,PEO3, PEO4,PSO2
2.	**CO2:** The ability to understand, analyze and design various combinational and sequential circuits.	PEO1,PEO2,PEO3,PSO1, PSO2
3.	**CO3:**The ability to identify and prevent various hazards and timing problems in a digital design	PEO1,PEO2,PEO3,PSO1, PSO2,PSO3
4.	**CO4:** To develop skill to build, and troubleshoot digital circuits.	PEO1,PEO3,PEO4,PSO1,PSO2, PSO3

CSE	Cos	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
	CO1	3	3		1		3	
	CO2	3	2	3		1	3	
	CO3	3	2	2		1	3	3
	CO4	3	2		2	2	2	3

School: SET		**Batch : 2019**		
Program: M Sc		**Current Academic Year: 2019-20**		
Branch: CS		**Semester: 1**		
1	Course Code	MCT 103	Course Name	
2	Course Title	Operating System Concept		
3	Credits	4		
4	Contact Hours (L-T-P)	3-1-0		
	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.		
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 philosophers problem), Implementation of synchronization algorithms.		CO1, CO2,CO3,CO4
	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
	C	Deadlock concepts & Handling Techniques(Avoidance, Prevention and Detection & Recovery)		CO1,CO2,CO3,CO4

	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
	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
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	3. 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,PO11, PSO5

PO and PSO mapping with level of strength for Course Name Operating System Concept

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

Schools: SET		Batch : 2019-20 Current Academic Year: 2019-20 Semester: 1st
1	Course Code	**ARP101**
2	Course Title	Communicative English-1
3	Credits	2
4	Contact Hours (L-T-P)	1-0-2
5	Course Objective	To minimize the linguistic barriers that emerge in varied socio-linguistic environments through the use of English. Help students to understand different accents and standardise their existing English. Guide the students to hone the basic communication skills - listening, speaking, reading and writing while also uplifting their perception of themselves, giving them self-confidence and building positive attitude.
6	Course Outcomes	CO1 Learn to use correct sentence structure and punctuation as well as different parts of speech. CO2 Learning new words its application and usage in different contexts helpful in building meaning conversations and written drafts. Develop over all comprehension ability, interpret it and describe it in writing. Very useful in real life situations and scenarios. CO2 A recognition of one's self and abilities through language learning and personality development training leading up to greater employability chances. Learn to express oneself through writing while also developing positive perception of self. To be able to speak confidently in English CO3 To empower them to capitalise on strengths, overcome weaknesses, exploit opportunities, and counter threats. To ingrain the spirit of Positive attitude in students through a full length feature film followed by a storyboarding activity. Create a Self Brand, identity and self esteem through various interesting and engaging classroom activity CO4 Exposing students to simulataions and situations wherein students learn to describe people and situations and handle such situations effectively and with ease. Teaching students how to engage in meaningful dialogues and active conversational abilities to navigate through challenging situations in life and make effective conversations. CO12 Learn how to transform adverse beginnings into positive endings – through writing activities like story completion.
7	Course Description	The course is designed to equip students, who are at a very basic level of language comprehension, to communicate and work with ease in varied workplace environment. The course begins with basic grammar structure and pronunciation patterns, leading up to apprehension of oneself through written and verbal expression as a first step towards greater employability.

8	Outline syllabus – ARP 201		
	Unit A	**Sentence Structure**	**CO Mapping**
	Topic 1	Subject Verb Agreement	CO1
	Topic 2	Parts of speech	
	Topic 3	Writing well-formed sentences	
	Unit B	**Vocabulary Building & Punctuation**	
	Topic 1	Homonyms/ homophones, Synonyms/Antonyms	CO1
	Topic 2	Punctuation/ Spellings (Prefixes-suffixes/Unjumbled Words)	CO1, CO1
	Topic 3	Conjunctions/Compound Sentences	CO1, CO2
	Unit C	**Writing Skills**	
	Topic 1	Picture Description – Student Group Activity	CO3
	Topic 2	Positive Thinking - Dead Poets Society-Full-length feature film - Paragraph Writing inculcating the positive attitude of a learner through the movie | SWOT Analysis – Know yourself	CO3, CO2, CO3
	Topic 3	Story Completion Exercise –Building positive attitude - The Man from Earth (Watching a Full length Feature Film)	CO2, CO3, CO4
	Unit D	**Speaking Skill**	
	Topic 1	Self-introduction/Greeting/Meeting people – Self branding	CO2, CO3
	Topic 2	Describing people and situations - To Sir With Love (Watching a Full length Feature Film)	CO3, CO4
	Topic 3	Dialogues/conversations (Situation based Role Plays)	CO2, CO4, CO4
9	Evaluations	*Class Assignments/Free Speech Exercises / JAM Group Presentations/Problem Solving Scenarios/GD/Simulations (60% CA and 40% ETE*	*N/A*
10	Texts & References | Library Links	• Blum, M. Rosen. *How to Build Better Vocabulary*. London: Bloomsbury Publication • Comfort, Jeremy(et.al). *Speaking Effectively*. Cambridge University Press	

Observations:

1. A Single Consolidated Syllabus has now replaced the Previous Functional English Beginners -1 and Functional English Intermediate -1
2. Credits previously allocated to FEN 01 Lab Sessions have been dissolved
3. The Pearson Voice Labs have been completely eliminated

Semester II

School:SET		**Batch : 2019**	
Program: M Sc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: II**	
1	Course Code	MCT104	Course Name
2	Course Title	Object Oriented Programming with Java	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status	PG	
5	Course Objective	**1.** Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc. **2.** Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms. **3.** Understand the principles of inheritance, packages and interfaces.	
6	Course Outcomes	Students will be able to: CO1. Identify classes, objects, members of a class and relationships among them needed for a specific problem. CO2. WriteJavaapplicationprogramsusingOOPprinciplesandproperDemonstrate the concepts of polymorphism and inheritance CO3.Write Java programs to implement error handling techniques using exception handling. CO4.How to test, document and prepare a professional looking package for each business project using javadoc.	
7	Course Description	Basic *Object Oriented Programming* (*OOP*) concepts, including objects, *classes*, methods, parameter passing, information hiding, inheritance and polymorphism are introduced and their implementations *using Java* are discussed.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Object Oriented Paradigm**	
	A	Introduction to OOP, Characteristics of OOP, Difference between OOP and procedural languages, Features of Java.s	CO1, CO2
	B	Java Source file structure, Prerequisites for compiling and running Java programs	CO1, CO2
	C	ByteCode, Architecture of JVM, ClassLoader Execution Engine, Garbage collection.	CO1, CO2,CO3
	Unit 2	**Introduction to Java**	
	A	Java development Kit(JDK),IntroductiontoIDEforjavadevelopment,Settingjava environment(stepsforpathandCLASSPATHsetting).	CO1, CO2,CO4
	B	Constants, Variables, Data Types, Operators, Expressions.	CO1, CO2,CO4
	C	Decision Making Branching, Loops, command line argument.	CO1, CO2,CO4

	Unit 3	**Class & Object**			
	A	Arrays, Type conversion & casting, Input from keyboard, Classes Objects			CO1,CO2,CO3
	B	MethodsMethod overloading, Constructors, Constructors overloading.			CO1,CO2,CO3
	C	static keyword,Access Modifiers, Strings, the string buffer class			CO4
	Unit 4	**Inheritance, package and InterfaceInheritance Implementation**			
	A	Multilevel Hierarchy, Overriding methods, Polymorphism, use ofthis and super, Constructor call in inheritance, Abstract class and method,			CO1,CO2,CO3
	B	Final class, method and variable, Implementing Interface, Concept of multiple inheritance in Java, Wrapper class			CO1,CO2,CO3
	C	Packages: User defined packages, built-in packages (java.langpackage).			CO1,CO2,CO3
	Unit 5	**Exception and Multithreading**			
	A	Input/output: Exploring java.io, File, Stream ClassesByte Stream Classes and Character stream Classes.			CO1,CO2,CO3,CO4
	B	reading and writing in file, Introduction to Exception Handling, Introduction to try, catch, Finally , throw and throws, Checked and Unchecked exceptions, User define exception			CO1,CO2,CO3
	C	Introduction to Multithreading: multithreading advantages and issues, Creating thread using Runnable interface and Thread class, Thread life cycle, Thread priorities, sleep method, Thread synchronization			CO1,CO2,CO3,CO4
	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. Identify classes, objects, members of a class and relationships among them needed for a specific problem.	PO1,PO2,PO3,PO4,PSO1
2.	CO2: Fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries of object collections.	PO1, PO3, PO4, PSO2

3.	CO3.Write Java programs to implement error handling techniques using exception handling.	PO1,PO2,PO3,PO4
4.	CO4.How to test, document and prepare a professional looking package for each business project using javadoc.	PO9, PO10,PO11, PSO5

PO and PSO mapping with level of strength for Course Name Object oriented programming with JAVA

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	PSO 4	PSO 5
CO 1	3	3	3	3	--	--	--	2	2	1	2	1	3	2	2	1	2
CO 2	3	2	3	3	--	--	--	2	2	2	1	1	2	3	2	1	2
CO 3	3	3	3	3	--	--	--	1	1	1	3	2	3	2	1	1	1
CO 4	2	2	2	2	1	--	--	2	3	3	3	1	2	2	2	1	3

School: SET		**Batch : 2019**			
Program: M Sc		**Current Academic Year: 2019-20**			
Branch: CS		**Semester: II**			
1	Course Code	MCL104			
2	Course Title	Object Oriented Programming with Java Lab			
3	Credits	1			
4	Contact Hours (L-T-P)	0-0-2			
	Course Status	Compulsory			
5	Course Objective	1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc. 2. Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms. 3. Understand the principles of inheritance, packages and interfaces.			
6	Course Outcomes	Students will be able to: CO1. Identify classes, objects, members of a class and relationships among them needed for a specific problem. CO2. Write Java application programs using OOP principles and proper Demonstrate the concepts of polymorphism and inheritance CO3. Write Java programs to implement error handling techniques using exception handling. CO4. How to test, document and prepare a professional looking package for each business project using javadoc.			
7	Course Description	Basic Object Oriented Programming (OOP) concepts, including objects, classes, methods, parameter passing, information hiding, inheritance and polymorphism are introduced and their implementations using Java are discussed.			
8	Outline syllabus				CO Mapping
	Unit 1	**Practical based on classes and objects**			CO1,CO2
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 2	**Practical based on constructors**			CO1,CO2
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 3	**Practical based on inheritance and package**			CO2, CO4
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 4	**Practical based on Polymorphism**			CO1, CO2
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 5	**Practical based on Exception handling**			CO1, CO3
		Sub unit - a, b and c detailed in Instructional Plan			
	Mode of examination	Practical			
	Weightage	CA	MTE	ETE	

	Distribution	60%	0%	40%	
	Text book/s*	1.Schildt H, “The Complete Reference JAVA2”, TMH			
	Other References	1. Balagurusamy E, “Programming in JAVA”, TMH 2. ProfessionalJava Programming:BrettSpell,WROX Publication			

School: SET		**Batch : 2019**	
Program: M Sc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: II**	
1	Course Code	MCT105 Course Name	
2	Course Title	Computer Organization and Architecture	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	PG	
5	Course Objective	Objective of this course is to study organization of a digital computer and design techniques for designing various components of a digital computer.	
6	Course Outcomes	Students will be able to: **CO1:** Evaluate and compare computer designs **CO2**: Design buses **CO3**: Design simple arithmetic circuits **CO4**: Compare various design techniques for control unit **CO5**: Construct and evaluate a memory system using RAM/ROM chips	
7	Course Description	This course covers basic topics about computer architecture and organization. The course provides the study of the structure, characteristics and operation of modern day computer systems including a basic background on the computers evolution, its design process and its internal characteristics which includes processor components, control unit architecture, memory organization and system organization.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Computer Organization**	
	A	History, Computer Organization vs. Computer Architecture, Bus: Types, Buses using multiplexers and tri-state buffers, Bus and memory transfer.	CO1, CO2
	B	Register transfer language, Micro-operations: Arithmetic,shift and logic micro operations	CO1, CO2,CO3
	C	Adder-Subtractor- Incrementor, Arithmetic unit, Logic unit.	CO1, CO2, CO3
	Unit 2	**Computer Arithmetic**	
	A	Representation of numbers in 1's and 2's complement, Addition and subtractionof signed numbers.	CO1, CO2,CO3
	B	Binary Multiplier,Multiplication: Signed operand multiplication, Booth algorithm	CO1, CO2,CO3
	C	Floating point representation: addition and subtraction.	CO1, CO2,CO3
	Unit 3	**Control Unit**	
	A	Hardwire and micro programmed control unit,	CO1,CO2,CO4
	B	Micro-programming Instruction Format	CO1,CO2,CO4
	C	Micro-programming Sequencer, Horizontal and vertical Micro-Programming.	CO1,CO2,CO4
	Unit 4	**Processor Organization**	
	A	Instruction cycle and sub cycles (fetch and	CO1,CO2,CO3

		e x e c u t e etc), interrupt: Types and cycle.			
	B	General register organization, stack organization			CO1,CO2,CO3
	C	Addressing modes, Instruction types, formats, RISC/CISC			CO1,CO2,CO3
	Unit 5	**Memory and I/O**			
	A	RAM/ROM memory, designing memory system using RAM and ROM chips			CO1,CO3,CO5
	B	Cache memory: Memory hierarchy, performance Considerations			CO1,CO3,CO5
	C	Input Output: Isolated I/O vs. memory mapped I/O, Programmed I/O, Interrupt driven I/O, DMA			CO1,CO3,CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. "Computer system architecture", Morris M. Mano, Prentice-Hall			
	Other References	1."Computer Organization", V. C. Hamacher et al., Mcgrew Hill. 2."Computer Organization and Architecture designing for performance" William Stallings, Pearson.			

CO and PO Mapping

S. No.	Course Outcome	Program Educational Objectives (PEO) & Program Specific Outcomes (PSO)
1.	**CO1:** Evaluate and compare computer designs	PEO1,PEO2,PSO1
2.	**CO2**:Design buses	PEO3, PEO4, PSO2
3.	**CO3**: Design simple arithmetic circuits	PEO2,PEO3,PO4
4.	**CO4**: Compare various design techniques for control unit	PEO1,PEO2,PSO3
5.	**CO5**: Construct and evaluate a memory system using RAM/ROM chips	PEO1,PEO2,PEO3,PEO4

PO and PSO mapping with level of strength for Course Name Computer Organization and Architecture (Course Code MCT105)

CSE	Cos	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
	CO1	3	3	1	1	3	1	-
	CO2	1	2	3	3	-	3	1
	CO3	1	3	3	3	1	1	1
	CO4	3	3	-	2	1	-	3
	CO5	3	3	3	3	1	1	2

School: SET		**Batch : 2019**	
Program: M Sc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester:**II	
1	Course Code	MCT106	
2	Course Title	Data Structures	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status	Core	
5	Course Objective	1. Learn the basicconcepts of Data Structures and algorithms. 2. Design and Implementation of Linear and Non linear 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.	
6	Course Outcomes	CO1: Understand the importance of various data structures. CO2: Evaluate algorithms and data structures in terms of time and memory complexity. CO3: Understand the application of linear data structure(s) to solve various problems CO4: Understand the application of non linear data structure(s) to solve various problems. CO5: Implement and know when to apply standard algorithms for searching and sorting. CO6: Identify and define the most appropriate data structure(s) for a given problem	
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. The course talks primarily about Linked list, stacks, queue, Tree structure, Graphs etc. This Course also deals with the concept of searching, sorting and hashing methods.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Data Structure – Definition, Operations, Applications and types. Abstract Data Types, Asymptotic Notations, Time and space complexity of algorithms.	CO1, CO2
	B	Recursion – Definition, Examples- Tower of Hanoi problem, Fibonacci Series	CO1
	C	Array Definition, Single and Multidimensional Arrays, Address Calculation, application of arrays, String Operation, Sparse Matrices, Lower and Upper Triangular matrices, and tri-diagonal	CO1, CO2

		matrices.			
	Unit 2	**Linked List**			
	A	Concept of Linked List, Representation of linked List in memory, Garbage Collection, Overflow and Underflow,			CO3, CO6
	B	Singly Linked Lists – Circular Linked Lists , Operations Associated with different linked list,			CO3, CO6
	C	Doubly Linked Lists, Operations Associated with different linked list, Polynomial representation and addition.			CO3, CO6
	Unit 3	**Stack and Queues**			
	A	Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Linked Representation of Stack, Applications of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.			CO3, CO6
	B	Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty.			CO3, CO6
	C	Circular queue, Dequeue, and Priority Queue.			CO3, CO6
	Unit 4	**Tree and Graph**			
	A	Trees: Terminologies, Trees – Binary Trees – Binary Tree Traversals – Binary Tree Representations – Binary Search Trees			CO4, CO6
	B	Threaded binary Trees – Application of Trees (Sets) – Binary Search Tree (BST), Insertion and Deletion in BST, AVL Trees			CO4, CO6
	C	Representation of Graphs – Graph Implementation – Graph Traversals– Application of Graph Traversals– Minimum Cost Spanning Trees – Shortest Path Problems.			CO4, CO6
	Unit 5	**Searching ,Sorting and Hashing**			
	A	Searching: Linear & Binary search			CO5
	B	Sorting: Bubble sort, Insertion sort,Selection sort, Quick sort, Shell sort, Merge sort, Heap Sort			CO5
	C	Hashing: Concepts, Hash Table, Hash Functions, Methods of Resolving Clashes			CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. Lipschutz, “Data Structures” Schaum’s Outline Series, TMH			
	Other References	1. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein “Data Structures Using C and C++” , PHI 2. Horowitz and Sahani, “Fundamentals of Data Structures”, Galgotia Publication 3. Jean Paul Trembley and Paul G. Sorenson, “An Introduction to Data Structures with applications”, McGraw Hill 4. R. Kruse etal, “Data Structures and Program Design in C”, Pearson Education			

		5. G A V Pai, “Data Structures and Algorithms”, TMH	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	Understand the importance of various data structures.	PO1, PO3, PSO1, PSO3
2.	Evaluate algorithms and data structures in terms of time and memory complexity.	PO2, PO4, PO9, PSO1, PSO2
3.	Understand the application of linear data structure(s) to solve various problems	PO1, PO2, PO3, PO9, PSO2
4.	Understand the application of non linear data structure(s) to solve various problems.	PO1, PO2, PO3, PO4, PO9, PSO2
5.	Implement and know when to apply standard algorithms for searching and sorting.	PO2, PO3, PO9, PSO3
6.	Identify and define the most appropriate data structure(s) for a given problem	PO3, PO4, PO5, PO9, PSO3

PO and PSO mapping with level of strength for Course Name Data Structures (MCT106**)**

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	PSO3	PSO 4
CSE	**Principles of Data Structures**																
	CO1	2		1										2		1	
	CO2		2		1					2				3	1		
	CO3	3	3	2						3					3		
	CO4	3	3	2	3					3					3		
	CO5		1	2												2	
	CO6			3	3	2										3	

School: SET		**Batch : 2019**	
Program: M Sc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: II**	
1	Course Code	MCL106	
2	Course Title	Data Structures 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 Linear and Non linear 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.	
6	Course Outcomes	CO1: Understand the importance of various data structures. CO2: Evaluate algorithms and data structures in terms of time and memory complexity. CO3: Understand the application of linear data structure(s) to solve various problems CO4: Understand the application of non linear data structure(s) to solve various problems. CO5: Implement and know when to apply standard algorithms for searching and sorting. CO6: Identify and define the most appropriate data structure(s) for a given problem	
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. The course talks primarily about Linked list, stacks, queue, Tree structure, Graphs etc. This Course also deals with the concept of searching, sorting and hashing methods.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
		Program to implement Operation on Array such as Traversing, Insertion & Deletion operation	**CO1**
	Unit 2	**Linked List**	
		Program to implement different operation on the following linked list: Singly, Doubly and circular linked list.	CO1, CO3, CO6
	Unit 3	**Stack & Queue**	
		Program to Implement Stack operation using Array and Linked list	CO1, CO3
		Program to convert infix expression to post fix expression	CO1, CO3
		Program on Evaluation of Post fix expression	CO1, CO3

		Program to implement queue operation using array and linked list			CO1, CO3
		Program to implement circular queue and deque.			CO1, CO3
	Unit 4	**Tree & Graphs**			
		Program to implement binary tree and BST.			CO4, CO6
		Program to implement MST and shortest path algorithm.			CO4, CO6
	Unit 5	**Searching, Sorting & Hashing**			
		Program on Searching, Sorting and Hashing			CO2, CO5
	Mode of examination	Practical			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Lipschutz, "Data Structures" Schaum's Outline Series, TMH			
	Other References	1. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++" , PHI 2. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication 3. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill 4. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education 5. G A V Pai, "Data Structures and Algorithms", TMH			

Course outline

This course starts with an introduction to data structures with its classification, array and pointer based implementations. As the course progresses the study of Linear and Non-Linear data structures are studied. The course talks primarily about Linked list, stacks, queue, Tree structure, Graphs etc. This Course also deals with the concept of searching, sorting and hashing methods..

Course Evaluation	
Attendance	None
Any other	CA judged on the practicals conducted in the lab , weightage may be specified
References	
Text book	1. Lipschutz, "Data Structures" Schaum's Outline Series, TMH
Other References	1. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++" , PHI 2. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication 3. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill 4. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education

	5. G A V Pai, “Data Structures and Algorithms”, TMH
Softwares	Turbo C/C++

School: SET		**Batch : 2019**		
Program: M Sc		**Current Academic Year: 2019-20**		
Branch: CS		**Semester: II**		
1	Course Code	MCT 107	Course Name	
2	Course Title	System Analysis and Design		
3	Credits	3		
4	Contact Hours (L-T-P)	3-0-0		
	Course Status	Compulsory		
5	Course Objective	1. This course provides an introduction to the fundamentals of distributed computer systems, 2. Designing Algorithms used in Distributed system. 3. Various issues and challenges used in Distributed System.		
6	Course Outcomes	Students will be able to: **CO1:** Apply software testing knowledge and engineering methods. **CO2:** Design and conduct a software test process for a software testing project. **CO3:** Identify the needs of software test automation, and define and develop a test tool to support test automation. **CO4:** Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.		
7	Course Description	This course introduces the concepts of System Analysis, algorithms, design issues and challenges in Distributed system, dentify the problems, and choose the relevant models and algorithms to apply.		
8	Outline syllabus			CO Mapping
	Unit 1	**Fundamental of System Development:**		
	A	System concept-characteristics-elements of system, types of system.		CO1, CO2
	B	Modern approach to system analysis and design, system development life cycle, approaches to improve the system development.		CO1, CO2
	C	Tools for system development, role of system analyst.		CO1, CO3
	Unit 2	**System Analysis:**		
	A	Determining system requirements, traditional methods, modern methods.		CO1, CO2,CO4
	B	Structuring system requirements, process modeling, data flow diagram.		CO1, CO2,CO4
	C	Logic modeling-conceptual data modeling, E-R modelling.		CO1, CO2,CO4
	Unit 3	**System Design:**		

	A	The Process and Stages of System Design, Design Methodologies, Development Activities.			CO1,CO2,CO3
	B	Input Design, Output Design.			CO1,CO2,CO3
	C	Types of Forms, Basics of Form Design.			CO4
	Unit 4	**Documentation**			
	A	Documentation: Importance, Types of documentation, Security, Disaster/ Recovery and Ethics in System Development:			CO1,CO2,CO3
	B	Threats to System Security, Control,			CO1,CO2,CO3
	C	Measures, Disaster/ recovery planning.			CO1,CO2,CO3
	Unit 5	**CASE Tools:**			
	A	Design Issues and CASE Tools Forms and Reports Design: Forms, Importance of Forms, Reports, Importance of Reports,.			CO1,CO2,CO3
	B	Differences between Forms and Reports, Process of Designing Forms and Reports, Deliverables and Outcomes, Design Specifications,			CO1,CO2,CO3
	C	Narrative Overviews, Sample Design, Testing and Usability Assessment, Types of Information, Internal Information, External Information, Turnaround Document, General Formatting Guidelines.			CO1,CO2,CO3
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	Elias M. Awad, System Analysis & Design, Galgotia.			
	Other References	1. Ramakrishna,Gehrke," Database Management Systems", Mc Grawhill 2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearsonn Education. 3. Tenanuanbaum, Steen," Distributed Systems", PHI. 4. Gerald Tel, "Distributed Algorithms", Cambridge University Press.			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:**Students will identify the core concepts of distributed systems.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:** the way in which several machines orchestrate to correctly solve.	PO1, PO3, PO4, PSO2
3.	**CO3:** Students will examine how existing systems have applied the concepts of distributed systems in designing large system.	PO1,PO2,PO3,PO4
4.	**CO4:** Can additionally apply these concepts to develop distributed systems.	PO9, PO10,PO11, PSO5

PO and PSO mapping with level of strength for Course Name Introduction to System Analysis and Design (MCT107)

CSE	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

Schools: SET		**Batch :** 2019	
		Current Academic Year: 2019-20	
		Semester: 2nd (Second)	
1	Course Code	**ARP102**	
2	Course Title	Communicative English -2	
3	Credits	2	
4	Contact Hours (L-T-P)	1-0-2	
5	Course Objective	To Develop LSRW skills through audio-visual language acquirement, creative writing, advanced speech et al and MTI Reduction with the aid of certain tools like texts, movies, long and short essays.	
6	Course Outcomes	**CO1** Move from primary self-assessment to larger goal and vision statement realisation with the help of feature length films as enablers and multimedia as language facilitators. **CO2** To develop a positive attitude through written expression of positive thought process and outlook with the help of writing activities like story completion et al. **CO3** Learn advanced writing skills in English like full length essays et al. **CO4** Master the science of speech and correct pronunciation through the accent-neutralisation program followed by reading sessions applying the lessons learnt.	
7	Course Description	The course takes the learnings from the previous semester to an advanced level of language learning and self-comprehension through the introduction of audio-visual aids as language enablers. It also leads learners to an advanced level of writing, reading, listening and speaking abilities, while also reducing the usage of L1 to minimal in order to increase the employability chances.	
8	Outline syllabus – ARP 202		
	Unit A	**Acquiring Vision, Goals and Strategies through Audio-visual Language Texts**	**CO Mapping**
	Topic 1	Pursuit of Happiness / Goal Setting & Value Proposition in life	CO1
	Topic 2	12 Angry Men / Ethics & Principles	
	Topic 3	The King's Speech / Mission statement in life | strategies & Action Plans in Life	
	Unit B	**Creative Writing**	
	Topic 1	Story Reconstruction - Positive Thinking	CO2
	Topic 2	Theme based Story Writing - Positive attitude	
	Topic 3	Learning Diary Learning Log – Self-introspection	
	Unit C	**Writing Skills 1**	

	Topic 1	Precis	CO3
	Topic 2	Paraphrasing	
	Topic 3	Essays (Simple essays)	
	Unit D	**MTI Reduction/Neutral Accent through Classroom Sessions & Practice**	
	Topic 1	Vowel, Consonant, sound correction, speech sounds, Monothongs, Dipthongs and Tripthongs	CO4
	Topic 2	Vowel Sound drills , Consonant Sound drills, Affricates and Fricative Sounds	
	Topic 3	Speech Sounds | Speech Music| Tone | Volume| Diction |Syntax |Intonation | Syllable Stress |	
	Unit E	**Gauging MTI Reduction Effectiveness through Free Speech**	
	Topic 1	Jam sessions	*N/A*
	Topic 2	Extempore	
	Topic 3	Situation-based Role Play	
9	Evaluations	*Class Assignments/Free Speech Exercises / JAM Group Presentations/Problem Solving Scenarios/GD/Simulations (60% CA and 40% ETE*	*N/A*
10	Texts & References | Library Links	• Wren, P.C.&Martin H. *High English Grammar and Composition*, S.Chand& Company Ltd, New Delhi. • Blum, M. Rosen. *How to Build Better Vocabulary*. London: Bloomsbury Publication • Comfort, Jeremy(et.al). *Speaking Effectively*. Cambridge University Press. The Luncheon by W.Somerset Maugham - http://mistera.co.nf/files/sm_luncheon.pdf	

Observations:

1. A Single Consolidated Syllabus has now replaced the Previous Functional English Beginners -2 and Functional English Intermediate -2

2. Credits previously allocated to FEN 02 the Lab Sessions have been dissolved

3. The Pearson Voice Labs have been completely eliminated

Semester III

School: SET		**Batch : 2019**	
Program: M Sc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: III**	
1	Course Code	MCT 201	Course Name
2	Course Title	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 decision and repetition structures in program design. CO2. Implement methods and functions to improve readability of programs. CO3. Demonstrate the use of Python lists, tuples and dictionaries CO4. Describe and apply object-oriented programming methodology. CO5. Apply top-down concepts in algorithm design. CO6. Write 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	**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	CO5
	B	**Lists:**Introduction, Accessing list, Operations, Working with lists, Functionand Methods with Lists	CO1,CO5
	C	**Tuple:**Introduction, Accessing tuples, Operations, Working, Functions and Methods with Tuples	C01,CO5
	Unit 2	**Dictionary, Functions and Exceptions**	
	A	**Dictionaries :**Introduction, Accessing values in dictionaries, Working with dictionaries,Functions	CO3
	B	**Functions:**Defining a function, Calling a function,	CO3

		Types of functions, Function Arguments, Anonymous functions, Global and local variables	
	C	**Exception Handling**: Definition Exception, Exception handling, Except clause, Try ? finally clause, User Defined Exceptions	CO3
	Unit 3	**Modules, Email Processing**	
	A	**Modules:** Importing module, Math module, Random module, Matplotlib, Packages	C02,CO6
	B	**Contacting User Through Emails Using Python:** Installing SMTP python module, Sending email, .	C02,CO6
	C	Reading from file and sending emails to all users addressing them directly for marketing	CO2,CO6
	Unit 4	**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 5	**Database Handling**	
	A	**Python Database Interaction**: SQL Database connection using python, Creating and searching tables, ,	C02,CO5,CO6
	B	Reading and storing config information on database	C02,CO5,CO6
	C	Programming using database connections	C02,CO5,CO6
	Mode of examination	Theory	
	Weightage Distribution	CA / MTE / ETE	
		30% / 20% / 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 decision and repetition structures in program design.	PO1,PO2,PO4,PSO1,PSO2
2.	CO2. Implement methods and functions to improve readability of programs.	PO1,PO5,PO2,PO3,PSO5,PSO2
3.	CO3. Demonstrate the use of Python lists, tuples and dictiaonries	PO2.PO3,PO1,PO5,PO11,PSO1,PSO,2
4.	CO4. Describe and apply object-oriented programming methodology.	PO2.PO3,PO1,PO5,PO11,PSO1,PSO,2
5.	CO5. Apply top-down concepts in algorithm design.	PO2.PO3,PO1,PO5,PO11,PSO1,PSO,2
6.	CO6. Write Python programs to illustrate concise and efficient algorithms	PO2.PO3,PO1,PO5,PO11,PSO1,PSO,2

PO and PSO mapping with level of strength for Course Name Programming in Python

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	PSO 4	PSO 5
CO 1	1	3	2	2	1	-	-	-	1	-	1	-	2	2	1	2	3
CO 2	3	3	3	3	3	-	-	-	3	-	3	-	3	3	3	3	3
CO 3	3	3	3	3	2	-	-	-	3	-	2	-	3	3	2	2	2
CO 4	2	2	2	1	2	-	--	-	2	-	1	-	2	1	1	2	1
CO 5	1	3	1	1	2				1		2		1	2	2	1	1
CO 6	2	2	2	2	3				1		2		2	1	1	2	2

School: SET		**Batch : 2019**	
Program: MSc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: III**	
1	Course Code	MCL201	
2	Course Title	Programming in Python	
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. Implement methods and functions to improve readability of programs. CO3. Demonstrate the use of Python lists, tuples and dictionaries CO4. Describe and apply object-oriented programming methodology. CO5. Apply top-down concepts in algorithm design. CO6. Write 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**	
		1. Program to implement all conditional statements **2. Program to implement different control structures**	CO1
	Unit 2	**Practical related to List, Tuples and ictionaries**	
		1. Program to implement operations on lists **2. Program to implement operations on Dictionary** **3. Program to implement operations on Tuple**	CO1,CO2,CO3
	Unit 3	**Practical related to Functions and Exception Handling**	
		1. Program to implement Exception Handling **2. Program to use different functions**	CO2,CO5
	Unit 4	**Practical related to Object Oriented Programming**	
		Program to use object oriented concepts like inheritance, overloading polymorphism etc. **Program for file handling**	CO4,CO6
	Unit 5	**Practical related to Database**	

<table>
<tr><td></td><td></td><td colspan="3">Program to make connections with different databases
Program to access database</td><td>CO6,CO4,CO2</td></tr>
<tr><td></td><td>Mode of examination</td><td colspan="3">Practical and Viva</td><td></td></tr>
<tr><td rowspan="2"></td><td rowspan="2">Weightage Distribution</td><td>CA</td><td>MTE</td><td>ETE</td><td></td></tr>
<tr><td>60%</td><td>0%</td><td>40%</td><td></td></tr>
<tr><td></td><td>Text book/s*</td><td colspan="3">1. The Complete Reference Python, Martin C. Brown, McGrwHill</td><td></td></tr>
<tr><td></td><td>Other References</td><td colspan="3">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</td><td></td></tr>
</table>

School: SET		**Batch :2019**	
Program: MSc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester:III**	
1	Course Code	MCT202 | Course Name:	
2	Course Title	**Introduction to 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 • Gain insight into the issues, challenges and work at all level of reference models • Provide the students with practice on applying network design • Enhance students communication and problem solving skills	
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, IP addressing, access control, flow and congestion control **CO3:**Have a basic knowledge of the use ofcryptography and network security; **CO4:**Understand and analyze working of various routing 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	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 protocols, IEEE Standards 802.3, 802.4,802.5	CO1, CO2
	Unit 3	**Network Layer**	
	A	Design issues , IPV4addressing basics and Header format, CIDR, sub-netting and sub-masking	CO1,CO2

	B	Routing, optimality Principle Routing protocols-, Shortest path, flooding, distance vector routing , link state routing			CO1,CO2,CO4
	C	Congestion control-Leaky bucket , Token Bucket, jitter control			CO1,CO2
	Unit 4	**Transport Layer**			
	A	Need of transport layer with its services, Quality of service, connection oriented and connection less			CO1,CO2
	B	Transmission Control Protocol: Segment structure and header format, TCPConnection Management, Flow Control			CO1,CO2
	C	TCP congestion control, Internet Congestion Control Algorithm, Overview of User Datagram Protocol (UDP)			CO1,CO2
	Unit 5	**Application Layer**			
	A	Domain Name System (DNS), HTTP, FTP, SMTP			CO1,CO2
	B	Network Security services, cryptography, Symmetric versus Asymmetric cryptographic algorithms- DES, and RSA			CO1,CO2,CO3
	C	Application of Security in Networks: Digital signature			CO1,CO2,CO3
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	5. 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	PO11,PO12,PSO2,PSO3,PSO4
2.	**CO2:**Investigate and explore fundamental issues driving network design	PO1,PO3,PO4,PO5,PO7,PO10,PO11PO12,PSO4
3.	**CO3:**Have a basic knowledge of the use of cryptography and network security;	PO1,PO2,PO4,PO6,PO7,PO8,PO10,PSO1,PSO3
4.	**CO4:**Understand and analyze working of various routing algorithms	PO2,PO7,PSO2,PSO3

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

School: SET		**Batch : 2019**			
Program: Msc		**Current Academic Year: 2019-20**			
Branch: CS		**Semester: 3**			
1	Course Code	MCL202			
2	Course Title	Introduction to Computer Networks Lab			
3	Credits	1			
4	Contact Hours (L-T-P)	0-0-2			
	Course Status	Compulsory			
5	Course Objective	• To identify the working difference between different topologies • To interpret the working principle of various communication protocols • To describe the concept of data transfer between nodes			
6	Course Outcomes	By the end of this course you will be able to: CO1: To interpret the working principle of various network topologies CO2: To analyze ALOHA, CSMA,CSMA/CD for packet communication between nodes connected to common topology CO3: Investigate and explore fundamental issues in IP addressing and application layer. CO4: To distinguish different flow control mechanism over an unreliable network			
7	Course Description	Familiarize the student with the basic taxonomy and terminology of the computer networking area. Encapsulate basic understanding of networking in a way to use and apply.			
8	Outline syllabus				CO Mapping
	Unit 1	**Introduction**			
		To implement the token passing access in BUS topology in LAN, To implement the token passing access in RING Topology -LAN. Familiarization with Networking Components and devices: Hubs, Switches, Routers etc.			CO1
	Unit 2	**Data link layer**			
		To create scenario and study the performance of network with ALOHA,CSMA , CSMA/CD protocol			CO2
	Unit 3	**Network Layer**			
		IP Addressing :sub netting, Super netting			CO3
	Unit 4	**Transport Layer**			
		Implementation of Stop and Wait Protocol , sliding window go back N protocol			CO4
	Unit 5	**Application Layer**			
		Implementation and study of Simple mail transfer protocol and file transfer protocol.			CO3
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	6. 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	

School:		**Batch : 2019**	
Program: MSc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: 3**	
1	Course Code	MCT203 Course Name	
2	Course Title	Principles of 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, 2. Implement and manipulate databases. 3. Introduce students to build data base management systems. 4. Apply DBMS concepts to various examples and real life applications.	
6	Course Outcomes	Students will be able to: 1. Apply the knowledge of databases to E-R modelling. 2. Apply major components of Relational Database model to database design. 3. Learn and apply Structured Query Language (SQL) for data definition and data manipulation. 4. Design a normalized database and able to perform transaction management concurrency control and recovery system.	
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:**	
	A	Concept & Overview of DBMS, Data Models, Database languages, Database Administrator, Database Users.	CO1
	B	Three Schema architecture of DBMS, Data Models, Hierarchical, Network ,Data independence and database language, DDL, DML, Data Modeling using Entity Relationship Model	CO1,CO2
	C	Strong Entity, Weak entity, Specialization and generalization, converting ER Model to relational tables.	CO1,CO2
	Unit 2	**Relational Database Language and Interfaces:**	
	A	Relational data model concepts ,Concept of keys, Mapping Constraints	CO3,CO2
	B	Null Values, Domain Constraints, Referential Integrity Constraints	CO3,CO2
	C	Unary Relational Operations: SELECT and PROJECT Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, SQL.	CO3,CO2
	Unit 3	**Normalization in Design of Databases:**	
	A	Functional Dependency, Different anomalies in designing a Database, Normalization first	CO4,CO2
	B	second and third normal forms, BoyceCodd normal form, multi-valued dependencies	CO4,CO2
	C	fourth normal forms, Inclusion dependencies, loss less join	CO4,CO2

		decompositions			
	Unit 4	**Transaction Management and Concurrency Control:**			
	A	Transaction processing system, schedule and recoverability, Testing of serializability, Serializability of schedules			CO4,CO2
	B	conflict & view serializable schedule.Concurrency Control: Locking Techniques for concurrency control			CO4,CO2
	C	time stamping protocols for concurrency control, multiversion schemes			CO4,CO2
	Unit 5	**Recovery System**			
	A	Failure Classification ,Recovery and Atomicity ,Recovery Algorithm			CO4,CO2
	B	Buffer Management ,Failure with Loss of Nonvolatile Storage			CO4,CO2
	C	Early Lock Release and Logical Undo Operations, ARIES, Remote Backup Systems .			CO4,CO2
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	2. 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:** To understand and implement classical algorithms in data mining and data warehousing.	PO1,PO2,PO3,PO10,PSO12,PSO3
2.	**CO2:** To assess the strengths and weaknesses of the algorithms.	PO1, PO2, PO3, PS5,PO9,PO10,PO11,PO12,PSO1,PSO2,PSO3
3.	**CO3:** To identify the application area of algorithms, and apply them.	PO1,PO2,PO3,PO5,PO9,PO10,PO11,PO12,PSO1,PSO2,PSO3
4.	**CO4:** To integrating and interpreting the data sets and improving effectiveness, efficiency and quality for data analysis.	PO1, PO2,PO3, PO4,PO5,PO9,PO10,PO11,PO12,PSO1,PSO2,PSO3,PSO4

PO and PSO mapping with level of strength for Course Name Principles of Database Management Systems

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

School: SET		**Batch : 2019**	
Program: MSc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: III**	
1	Course Code	MCL203	
2	Course Title	Principles of 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: Understandthe concept of SQL commands in DBMS CO2: Create SQL SELECT statements that retrieve any required data CO3: Perform operations using Data Manipulation Language statements like Insert, Update and Delete CO4: Manipulate your data to modify and summaries your results for reporting	
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 Data types**	
		Classification SQL, Data types of SQL/Oracle	CO1,CO2
	Unit 2	**Practical based on DDL commands**	
		Create table , Alter table and drop table	CO1,CO2
	Unit 3	**DML commands and Aggregate functions**	
		Introduction about the INSERT, SELECT , UPDATE & DELETE command.,sum,avg,count,max,min	CO2,CO4
	Unit 4	**Practical based on Grouping Clauses GROUP BY ORDER BY & GROUP BY HAVING**	CO1,CO4
		Briefly explain Group by, order by , having clauses with examples.	
	Unit 5	**Practical based on Sub- queries, JOINS**	CO1,CO4
		Related example of Sub- queries, Joins and related examples	
	Mode of	Jury/Practical/Viva	

	examination				
	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.			

School: SET		**Batch : 2019**	
Program: MSc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester:** III	
1	Course Code	MCT 204	Course Name
2	Course Title	Software Engineering	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Core	
5	Course Objective	• Provide students with an overview of the Software development life cycle for software development methodologies. • Provide students with insights on requirement gathering activities. • Provide the students with design methodology practices. • Gain Insights about testing techniques. • Apply Quality management and reliability measurement techniques.	
6	Course Outcomes	Students will be able to: CO1: Illustrate software characteristics and Implement different software development methodologies. CO2: Perform requirement gathering in requirement analysis. CO3: Design UML diagrams/DFD/ER diagrams for development of a software and apply testing techniques using test cases and test suites. CO4: Conduct all aspects of software quality maintenance process.	
7	Course Description	The objective of this course is to provide fundamental knowledge of software engineering, and make student aware of best software engineering practices, and contemporary software engineering tools.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to software engineering**	
	A	Introduction to software engineering, Importance of software, Software characteristics, Software applications, Software crisis and its causes.	CO1
	B	Waterfall model, Incremental model, Prototyping Model, Spiral Model,	CO1
	C	Introduction to Agile Process models, Scrum, case studies.	CO1
	Unit 2	**Software requirement Specification**	
	A	Fundamentals, Requirement gathering process, Requirements elicitation, Requirements analysis, Requirements specification,	CO2
	B	Requirements validation, DFD, ER-diagrams, Decision Tables,	CO2
	C	IEEE standards for SRS with examples.	CO2
	Unit 3	**Software Design**	
	A	System Design, Problem Partitioning, Top-Down and Bottom-Up	CO3

		design,			
	B	Effective modular design -Cohesion and Coupling Functional vs. Object- Oriented approach,			CO3
	C	Introduction to UML, UML diagrams, Coding standards and guidelines.			CO3
	Unit 4	**Software Testing**			
	A	Fundamental of testing, Some Terminologies: Error, Mistake, Bug, Fault and Failure,			CO3
	B	Testing: -Levels of Testing, and Structures testing - Black Box, testing and white box testing,			CO3
	C	Software testing strategies: Integration Testing, Unit Testing, System Testing, Validation and Verification, test cases, overview of debugging.			CO3
	Unit 5	**Software Quality Assurance**			
	A	Quality concepts: Quality, Quality Control, Cost of Quality, Software Quality Assurance,			CO4
	B	Software Reliability: Measures of Reliability and Availability, Software Safety, Software Quality Assurance Plan, COCOMO, COCOMO-II,			CO4
	C	Framework and models like ISO 9000, CMM, and Statistical Software Quality Assurance: Six Sigma For Software Engineering.			CO4
	Mode of examination	Theory			
	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. Jalote, Pankaj, "Software Engineering"New Delhi: Narosa (Latest Ed.) 3. SADSE (System Analysis Design) - Prof. Khalkar and Prof. Parthasarathy. 4. Schaum's Series, "Software Engineering" TMH			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Illustrate software characteristics and Implement different software development methodologies.	PO1,PO2,PO7,PO9,PO10, ,PSO1
2.	CO2: Perform requirement gathering in requirement analysis.	PO2, PO3, PO4, PO5, PSO2
3.	CO3: Design UML diagrams/DFD/ER diagrams for development of a software and apply testing techniques using test cases and test	PO1,PO2,PO3,PO4, PO6, PO9, PO11, PO12

	suites.	
4.	CO4: Conduct all aspects of software quality maintenance process.	PO6,PO11, PSO5

PO and PSO mapping with level of strength for Course Name Software Engineering

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

School: SET		**Batch :** 2019	
		Current Academic Year: 2019-20	
		Semester: 3rd	
1	Course Code	**ARP203**	
2	Course Title	Logical Skills Building and Soft Skills	
3	Credits	2	
4	Contact Hours (L-T-P)	1-0-2	
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	CO1: *Know Yourself – A proven Student engagement model to assess individual skill level* CO2: *To identify a student's TNI/TNA (Training Need Identification and Analysis) data* CO3: *To make students self-aware | raise self-esteem & effectiveness* CO4: *To build positive thinking in students and reinforce positive attitude building* CO5: *How to build positive emotional competence in students | GOAL Setting and SMART Goals* CO6: *Enhancing LSRW (Listening Speaking Reading Writing) | Verbal Abilities - 1* CO7: *Understanding AMCAT + ELITMUS Study patterns for Quantitative aptitude and Logical | Analytical Reasoning*	
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 203		
	Unit 1	**BELLS (Building Essential Language and Life Skills)**	**CO Mapping**
	A	Subject Verb Agreement | One word substitution, writing well formed sentences, tense, preposition,	*CO1, CO2,*
	B	Idioms, phrases, spotting the errors , root verb error, prefix & suffix	*CO3*
	C	*Know Yourself*: Techniques of Self Awareness | Self Esteem & Effectiveness| Building Positive Attitude | Building Emotional Competence	*CO4, CO5,CO6*
	D	Positive Thinking & Attitude Building | Goal Setting and SMART Goals – Milestone Mapping | Enhancing L S R W G and P (Listening Speaking Reading) | Verbal Abilities - 1	*CO5, CO6*
	Unit 2	**Introduction to APTITUDE TRAINING- Reasoning- Logical/ Analytical**	
	A	Syllogism | Letter Series | Coding, Decoding , Ranking & Their Comparison Level-1	*CO7*
	B	Number Puzzles	*CO7*
	C	Selection Based On Given Conditions	*CO7*

	Unit 3	**Quantitative Aptitude**	
	A	Number Systems Level 1 | Vedic Maths Level-1	*CO7*
	B	Percentage ,Ratio & Proportion | Mensuration - Area & Volume |Algebra	*CO7*
	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*	

School: SET		**Batch : 2019**	
Program: M.Sc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: 3**	
1	Course Code	MCT209 | Course Name: Graph Theory and its Application	
2	Course Title	Graph Theory and its Application	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Regular	
5	Course Objective	The objective of the course is to teach students the basic graph theory concepts and their applications in computer science.	
6	Course Outcomes	After successful completion of the course students will be able to **1.** demonstrate some of the most important notions and types of graph theory and develop their skill in solving basic exercises **2.** interpret the fundamentals of graphs and trees and to relate them with the use in computer science applications **3.** explore a graph with the help of matrices and to find a minimal spanning tree for a given weighted graph **4.** apply graph-theoretic algorithms and methods used in computer science **5.** develop efficient graph-theoretic algorithms (mathematically) explore the applications of coloring problem of graph theory	
7	Course Description	This course is to teach students the basic graph theory concepts and their applications in computer science. It also focus on advanced concepts of graph algorithm used in real life.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Basic terminologies and concepts of Graph Theory, Fundamental types of graphs, Applications in various areas	CO1
	B	Properties of graphs, theorems based on different types of graph and various operations on graphs	CO1
	C	Special types of graphs (Hamiltonian, Euler), Peterson graph, Dodecahedral graph, Travelling salesman problem.	CO1
	Unit 2	**TREES**	
	A	Fundamentals of trees and their types, Binary trees and their properties, importance of binary trees in data structure (searching algorithms)	CO2
	B	fundamental circuits, spanning trees, algorithms to find spanning trees in a weighted graph (Kruskal & Prim)	CO2, CO3
	C	Applications: Representation of the algebraic expressions as ordered binary trees, Huffman procedure for construction of an optimal tree for a given set of weights.	CO2, CO4
	Unit 3	**CUT SETS**	
	A	a cut-set of a connected graph, the fundamental circuit , Properties of circuits & cut–sets, Concept of connectivity and separability, 1-isomorphism, 2-isomorphism	CO1,CO4
	B	Concept of Planar graphs with introduction to Kuratowski's non-	CO4

		planar graphs, Proof of Euler's formula			
	C	Detection of planarity , geometric duals of graph, thickness & Crossings, network flow			CO5
	Unit 4	**Coloring and Covering**			
	A	Concept of proper coloring of vertices of a graph, chromatic number , Chromatic partitioning			CO4, CO5
	B	Chromatic polynomial, finding chromatic polynomial of a given graph			CO4, CO5
	C	Matching, Covering, Five color problem and its proof			CO4, CO5
	Unit 5	**Matrix Representation of Graphs & Applications**			
	A	Incidence matrix, sub matrices of A(G), circuit matrix, fundamental circuit matrix and Rank of B, Adjacency matrix			CO3, CO4
	B	Cut set matrix, fundamental cut set matrix, path matrix. Finding Rank of different matrices, Relationship among A_f, B_f, and C_f			CO4, CO5
	C	Applications: Graph in game theory, graph in coding theory			CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	**1.** Deo, N, *Graphtheory with applications to Engineering and Computer Science*, Prentice Hall India			
	Other References	**1.** Wilson R J, *Introduction to Graph Theory*, PearsonEducation **2.** Harary, F, *Graph Theory*, Narosa **3.** Bondy& Murthy, *Graph theory and application*. Addison Wesley			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: demonstrate some of the most important notions and types of graph theory and develop their skill in solving basic exercises	PSO1
2.	CO2: interpret the fundamentals of graphs and trees and to relate them with the use in computer science applications	PSO1
3.	CO3: explore a graph with the help of matrices and to find a minimal spanning tree for a given weighted graph	PSO1, PSO2
4.	CO4: apply graph-theoretic algorithms and methods used in computer science	PSO1, PSO2
5.	CO5: develop efficient graph-theoretic algorithms (mathematically) explore the applications of colouring problem of graph theory	PSO1, PSO2

PO and PSO mapping with level of strength for Course Name: Introduction to Graph Theory and its applications

CSE	Cos	PSO1	PSO2	PSO3
	CO1	3	2	1
	CO2	3	2	1
	CO3	3	3	1
	CO4	3	3	1
	CO5	3	3	1

School: SET		**Batch : 2019**	
Program: MSc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: III**	
1	Course Code	MCT 210	
2	Course Title	**Software Project Management**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Non Elective	
5	Course Objective	• Introduces students with an overview and concepts of software project management. • Gain insight into the challenges and limitations of different phases of software project management • Using techniques for planning, monitoring and control of software projects • Prepare students understand project evaluation and software effort estimation. • Enhance the managerial and leadership skillsof the students	
6	Course Outcomes	Students will be able to: **CO1:** Apply software project management and engineering methods in the projects under taken. **CO2:**design and conduct a software effort estimation in a project under taken **CO3:**Develop the ability to lead or, work in a team till the completion of a project. **CO4:** Have an ability understand and identify various software project management problems, and solve these problems by designing and selecting appropriate strategies, and methods.	
7	Course Description	This course introduces concepts of software project management in which Project Planning, Project Evaluation, Software Effort estimation, Monitoring and control and Managing contracts tools and techniques are included.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Introduction to software project management, software projects versus other types of project,	CO1, CO2
	B	activities covered by software project management, the project as a system, problems with software projects,	CO1, CO2
	C	management control, stakeholders, requirement	CO1, CO2

		specification, information and control in organization.			
	Unit 2	**Project Planning**			
	A	Introduction to step wise project planning, select project, identify project scope and objectives,			CO1, CO2,CO4
	B	identify project infrastructure, analyze project characteristics, identify project products and activities,			CO1, CO2,CO4
	C	estimate effort for each activity, identify activity risk, allocate resources, review/publicize plan, execute plan and lower levels of planning			CO1, CO2,CO4
	Unit 3	**Project Evaluation**			
	A	Strategic assessment, Technical assessment: cost-benefit analysis, cash flow forecasting,			CO1,CO2,CO3
	B	cost-benefit evaluation techniques, risk evaluation.			CO1,CO2,CO3
	C	Application development models: the waterfall model, the V-process model, the spiral model, software prototyping, tools			CO4
	Unit 4	**Software Effort estimation**			
	A	Introduction, Where are estimates done?, problems with over and under estimates,			CO1,CO2,CO3
	B	the basis for software estimating, effort estimation techniques, expert judgment, estimating by analogy, Albert function point analysis,			CO1,CO2,CO3
	C	Function points MARK II, object points, COCOMO, publishing the resource schedule, cost schedule, the scheduling sequence			CO1,CO2,CO3
	Unit 5	**Monitoring and Managing contracts**			
	A	Creating the framework, collecting the data, visualizing progress, cost monitoring, earned value,			CO1,CO2,CO3
	B	prioritizing monitoring, getting the project back to target, change control.			CO1,CO2,CO3
	C	Managing contracts: types of contract, stages in contract placement, typical terms of a contract, contract management, contract management, acceptance.			CO1,CO2,CO3
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. Software Project Management, Bob Hughes and Mike Cotterell, McGraw Hill			
	Other References	2. Software Project Management A Unified Framework, Walker Royce, Addison-Wesley 3. A practitioner's Guide to Software Engineering, Roger Pressman, Tata McGraw Hill 2014 8th edition. 4. 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:** Apply software project management and engineering methods in the projects under taken.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:**design and conduct a software effort estimation in a project under taken	PO1, PO3, PO4, PSO2
3.	**CO3:**Develop the ability to lead or, work in a team till the completion of a project.	PO1,PO2,PO3,PO4
4.	**CO4:** Have an ability understand and identify various software project management problems, and solve these problems by designing and selecting appropriate strategies, and methods.	PO9, PO10,PO11

PO and PSO mapping with level of strength for Course Name Software Project Management

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

Semester IV

School: SET		**Batch : 2019**	
Program:MSc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: IV**	
1	Course Code	MCT205 | Course Name	
2	Course Title	Design and Analysis of Algorithms	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status	UG	
5	Course Objective	Objective of this course is to 1. Reinforce basic design concepts (e.g., pseudocode, specifications, top-down design) 2. Knowledge of algorithm design strategies 3. Familiarity with an assortment of important algorithms. 4. Enable students to analyze time and space complexity	
6	Course Outcomes	Students will be able to: **CO1:**Analyze the asymptotic performance of algorithms **CO2**:Write rigorous correctness proofs for algorithms. **CO3:** Demonstrate a familiarity with major algorithms and data structures **CO4:**Apply important algorithmic design paradigms and methods of analysis	
7	Course Description	This course introduces concepts related to the design and analysis of algorithms. Specifically, it discusses recurrence relations, and illustrates their role in asymptotic and probabilistic analysis of algorithms. It covers in detail greedy strategies divide and conquer techniques, dynamic programming and max flow - min cut theory for designing algorithms, and illustrates them using a number of well-known problems and applications.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework	CO2, CO3
	B	Asymptotic Notations and their properties – Mathematical analysis for Recursive and Non-recursive algorithms, Recurrences relations	CO1, CO2, CO3
	C	Divide-and-conquer: Analysis and Structure of divide-and-conquer algorithms, Divide-and-conquer examples- Binary search, Quick sort, Merge sort, Medians and Order Statics	CO1, CO2, CO4
	Unit 2	**Dynamic Programming**	
	A	Overview, Difference between dynamic programming and divide and conquer	CO1, CO2, CO3, CO4
	B	Applications and analysis: Matrix Chain	CO1, CO2, CO4

		Multiplication, 0/1 Knapsack Problemrecords	
	C	Applications and analysis: Longest Common sub-sequence, All pairs shortest paths	CO1, CO2, CO3, CO4
	Unit 3	**Greedy Method**	
	A	Overview of the Greedy paradigm, Analysis and example of exact optimization solution, Minimum Spanning Tree – Prim's and Kruskal's Algorithm	CO1,CO2,CO4
	B	Fractional Knapsack problem, Single source shortest paths, task scheduling	CO1,CO2,CO3, CO4
	C	Overview and analysis of Backtracking & Branch and Bound: N-Queens problem and Sum of subsets	CO1, CO2, CO3, CO4
	Unit 4	**Advanced Data Structures**	
	A	Red-Black Trees - Definition, Applications, Insertion and deletion of elements in RB-Tree	CO1,CO2,CO3
	B	B-Trees - Definitions, Applications, Insertion and Deletion in B-Trees	CO1,CO2,CO3
	C	Data Structure for Disjoint Sets - Definition, Operations, Applications in Kruskal's algorithm.	CO1,CO2,CO3
	Unit 5	**Selected Topics**	
	A	Introduction to NP Complete and NP Hard Problems, Examples, Amortized Analysis	CO1,CO2,CO3,
	B	Approximation Algorithms – Travelling Sales Person Problem and Vertex Cover Problem, Randomized Algorithms.	CO1,CO2,CO3,
	C	String Matching Algorithms – Naive String Matching Algorithm, Rabin Karp Algorithm.	CO1,CO2,CO3
	Mode of examination	Theory	
	Weightage Distribution	CA / MTE / ETE	
		30% / 20% / 50%	
	Text book/s*	1. Cormen et al., "Introduction of Computer Algorithms", Prentice Hall India	
	Other References	1. Sahni et al., "Fundamentals of Computer Algorithms", Galgotia Publications. 2. 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.	**CO1:** Analyze the asymptotic performance of algorithms	PO1,PO2,PO3,PO4,PSO1
2.	**CO2**: Write rigorous correctness proofs for algorithms	PO1, PO3, PO4, PSO2
3.	**CO3:** Demonstrate a familiarity with major algorithms and data structures	PO1,PO2,PO3,PO4
4.	**CO4:** Apply important algorithmic design paradigms and methods of analysis	PO9, PO10,PO11, PSO5

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

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	PSO 4	PSO 5
CO 1	3	3	3	3	--	--	--	2	2	1	2	1	3	2	2	1	2
CO 2	3	2	3	3	--	--	--	2	2	2	1	1	2	3	2	1	2
CO 3	3	3	3	3	--	--	--	1	1	1	3	2	3	2	1	1	1
CO 4	2	2	2	2	1	--	--	2	3	3	3	1	2	2	2	1	3

School: SET		**Batch : 2019**			
Program: MSc		**Current Academic Year: 2019-20**			
Branch: CS		**Semester: IV**			
1	Course Code	MCL205			
2	Course Title	Design and Analysis of Algorithms LAB			
3	Credits	1			
4	Contact Hours (L-T-P)	0-0-2			
	Course Status	Compulsory			
5	Course Objective	Objective of this course is to • Reinforce basic design concepts (e.g., pseudocode, specifications, top-down design) • Knowledge of algorithm design strategies • Familiarity with an assortment of important algorithms. • Enable students to analyze time and space complexity			
6	Course Outcomes	Students will be able to: **CO1:** Analyze the asymptotic performance of algorithms **CO2**: Write rigorous correctness proofs for algorithms. **CO3:** Demonstrate a familiarity with major algorithms and data structures **CO4:** Apply important algorithmic design paradigms and methods of analysis			
7	Course Description	This course introduces concepts related to the design and analysis of algorithms. Specifically, it discusses recurrence relations, and illustrates their role in asymptotic and probabilistic analysis of algorithms. It covers in detail greedy strategies divide and conquer techniques, dynamic programming and max flow - min cut theory for designing algorithms, and illustrates them using a number of well-known problems and applications.			
8	Outline syllabus				CO Mapping
	Unit 1	**Practical based on algorithm design by brute force and divide and conquer paradigm**			CO1, CO2, CO4
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 2	**Practical related to dynamic programming paradigm**			CO1, CO2. CO3, CO4
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 3	**Practical related to greedy method**			CO2, CO3, CO4
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 4	**Practical related to advanced data structures**			CO2, CO3, CO4
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 5	**Practical related to string matching algorithms**			CO1, CO2, CO3, CO4
		Sub unit - a, b and c detailed in Instructional Plan			
	Mode of examination	Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	

	Text book/s*	-	
	Other References		

School: SET		**Batch :2019**	
Program: MSc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: 4**	
1	Course Code	MCT 211	Course Name
2	Course Title	**Advanced Database Management Systems**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	PE I1	
5	Course Objective	**The objective of this course is to:** 1. Exhibit memory of previouslylearnedmaterial byrecalling facts, terms, basic concepts. 2. To Understand the different architecture of databases. 3. To Learn & Solve the new database structure problems 4. Handling different user views of the same stored data, combining interrelated data , setting standards, controlling concurrent updates so as to maintain data integrity.	
6	Course Outcomes	**Students will be able to:** 1. To Unterstand the overview of Database 2. To learn the types of system architectures commercial relational database system 3. Understand the various concepts about the distributed databases and its architectures. 4. Understand the basic concepts of Concurrecy control, Times & validation based protocols,Predicate reads 5. Understand and analyze the database storage structures and access techniques like, indexing methods, hashing methods, query evaluation techniques and and query optimization.	
7	Course Description	This course introduces advanced aspects of data	
8	Outline syllabus		CO Mapping
	Unit 1	**INTRODUCTION TO DATABASES AND ER DIAGRAM**	
	A	Concept & Overview of DBMS, Data Models,	CO1
	B	Three Schema architecture of DBMS Data Models, Schema – Star and Snowflake	CO1
	C	DDL and DML commands, Domain Constraints, Referential Integrity Constraints, Views,	CO1

	Unit 2	**SYSTEM ARCHITECTURE**			
	A	Database-System Architectures, Centralized and Client – Server Architectures , Server System Architectures,			CO1, CO2
	B	Parallel Databases, Introduction,Parallelism , Interquery Parallelism ,Intraquery Parallelism,,			CO1, CO2
	C	Intraoperation Parallelism, Interoperation Parallelism, Query Optimization Design of Parallel Systems			CO1, CO2
	Unit 3	**DISTRIBUTED DATABASE CONCEPTS & ARCHITECTURES**			
	A	Distributed Database Concepts ,Homogenous Heterogenous database, Distributed Data storage ,			CO1,CO3
	B	Transaction & query processing, Overview of Transaction Management in Distributed Databases, Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design			CO1,CO3
	C	Overview of Concurrency Control and Recovery in Distributed Databases, Query Processing and Optimization in Distributed Databases Types of Distributed Database Systems , Distributed Database Architectures			CO1,CO3
	Unit 4	**CONCURRENCY CONTROL**			
	A	Lock-Based Protocols ,Deadlock Handling, Multiple Granularity ,Timestamp-Based Protocols ,Validation-Based Protocols,			CO1,CO4
	B	MultiversionSchemes ,Snapshot Isolation, Insert Operations, Delete Operations, and Predicate Reads			CO1,CO4
	C	Insert Operations, Delete Operations, and Predicate Reads, Weak Levels of Consistency in Practice			CO1,CO4
	Unit 5	**DATABASES AND PERFORMANCE TUNING**			
	A	Temporary Tables, Indexing and Hashing (**SQL)**–			CO5
	B	Query Processing, Query Optimization, Data Fragmentation			CO5
	C	(Horizontal Vs Vertical), Pivot, Delta Queries.			CO5
	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 2. Elmasri, Navathe, Fundamentals of Database Systems, Pearson Education Inc.			
	Other References	1. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to design, Implementation and Management, Pearson Education, Latest Edition. 2. Jeffrey D. Ullman, Jennifer Windon, A first course in Database Systems, Pearson Education. 3. Date C.J., An Introduction to Database Systems, Addison Wesley. 4. Richard T. Watson, Data Management: databases and organization, Wiley.			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:**To Unterstand the overview of Database To learn the types of system architectures commercial relational database system .	PO1,PO2,PO3,PSO1
2.	**CO2**Understand the various concepts about the distributed databases and its architectures.	PO1, PO3, PO9, PSO3
3.	**CO3:**Understand the basic concepts of Concurrecy control, Times & validation based protocols,Predicate reads	PO1,PO2,PO9,PO4
4.	**CO4:** Understand and analyze the database storage structures and access techniques like, indexing methods, hashing methods, query evaluation techniques and and query optimization.	PO2, PO3,PO9, PSO1

PO and PSO mapping with level of strength for Course Name Advanced Data base Management Systems

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

School: SET		**Batch : 2019**		
Program: MSc		**Current Academic Year: 2019-20**		
Branch: CS		**Semester: IV**		
1	Course Code	MCT 212	Course Name:	
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 routing, DSDV, DSR, AODV		CO2,CO3

	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

CSE	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
	CO2	3	3	1	1	1	2	2	2	2	2	2	2	2	3	2	2	1
	CO3	3	1	3	1	1	1	1	2	1	1	1	1	3	3	2	1	2

School: SET		**Batch : 2019**	
Program: MSc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: IV**	
1	Course Code	MCT208 | 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 networks; Single Layer and Multi-Layer n/w.			CO4
	Unit 5	**APPLICATIONS**			
	A	case studies on NLP, Image Processing;,			CO1,CO5
	B	Robotics – Hardware; Vision; Navigation based case studies,			CO1,CO5
	C	Water jug problem and similar case studies			CO1,CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		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

CSE	Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
	CO1	3	3	1	1	--	--	3	-	2	2	-	-	3	-	-	-	-
	CO2	1	2	3	3	3	--	--	1	1	1	-	-	1	2	-	-	-

	CO 3	3	3	3	3	--	2	--	1	2	1	3	2	-	-	-	-	-
	CO 4	1	1	1	1	-	3	--	1	1	-	3	1	1	1	1	1	3
	CO 5	1	1	1	1	-	-	--	1	3	1	3	2	1	1	1	1	2

School: SET		**Batch :** 2019-20	
		Current Academic Year: 2019-20	
		Semester: 4th	
1	Course Code	**ARP204**	
2	Course Title	Quantitate and Qualitative Aptitude Sill Building	
3	Credits	2	
4	Contact Hours (L-T-P)	1-0-2	
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	CO1: *Learn what is VMOSA (Vision, Mission, Values and Ethics) Communication Process* CO2: *Communication Styles and flexing and 4 social styles of communication* CO3: *Understand Listening Skills and Listening Styles* CO4: *Understanding the Art of giving feedback and probing* CO5: *Business writing skills and non-verbal communication* CO6: *MTI Reduction Program | Verbal Abilities - 2* CO7: *2nd Level proficiency in Quant & Aptitude Reasoning abilities*	
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 – ARP204		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 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 - Sentence Arrangements, Correction Analogies| The Art of Giving Feedbacks| Feedback Skills | Asking fact finding questions- Probing Skills	CO2, CO3,CO4
	C	Email Etiquette | Business Writing Skills| Telephone Etiquette Skills (Telephone Handling Skills) | Non Verbal Communication-Kinesics, Proxemics, Paralanguage | MTI Reduction Program | Verbal Abilities - 2	CO5, CO6
	Unit 2	**Introduction to APTITUDE TRAINING- Reasoning- Logical/ Analytical**	
	A	Coding Decoding , Ranking & Their Comparison Level-2	CO7
	B	Series, Blood Relations & Number Puzzle	CO7
	Unit 3	**Quantitative Aptitude**	

	A	Number System Level 2	CO7
	B	Vedic Maths Level-2 | Probability | Permutation & Combination	CO7
	C	Percentage, Profit & Loss ,Partnership, Simple Interest & Compound Interest	CO7
	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*	

School: SET		**Batch : 2019**	
Program: MSc		**Current Academic Year: 2019-20**	
Branch:-- CS		**Semester: 4**	
1	Course Code	MCT 213	Course Name
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	• Provide students with an overview of the methodologies and approaches to data mining • Gain insight into the challenges and limitations of different data mining techniques • Provide the students with practice on applying data mining solutions • Prepare students for research in the area of data mining and related applications • Enhance students communication and problem solving skills	
6	Course Outcomes	Students will be able to: **CO1:** To understand and implement classical algorithms in data mining a **CO2:** To assess the strengths and weaknesses of the algorithms **CO3:** To identify the application area of algorithms, and apply them. **CO4:** To integrating and interpreting the data sets and improving effectiveness, efficiency and quality for data analysis.	
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, CO2
	B	Knowledge Discovery Process,	CO1, CO2
	C	Introduction to outlier.	CO1, CO2
	Unit 2	**Data Preprocessing**	
	A	Descriptive Data Summarization, Data Cleaning,	CO1, CO2,CO4
	B	Integration and Transformation,	CO1, CO2,CO4
	C	Data Reduction, Discretization and Concept Hierarchy Generation.	CO1, CO2,CO4
	Unit 3	**Frequent Pattern Mining**	
	A	Efficient and Scalable Frequent Itemset Mining Methods: Aprori	CO1,CO2,CO3

	B	FPGrowth, ECLATS			CO1,CO2,CO3
	C	correlation Analysis.			CO4
	Unit 4	**Classification& Prediction**			
	A	What is classification, requirements of classification, Decision Tree-ID3Algorithm, ,			CO1,CO2,CO3
	B	Naive Bayes Classifier, Rule Based classification, Backpropogation			CO1,CO2,CO3
	C	Support Vector Machine for linearly separable data. Prediction: - Linear Regression.			CO1,CO2,CO3
	Unit 5	**Clustering**			
	A	What is cluster analysis, requirements of cluster analysis,			CO1,CO2,CO3
	B	Partitioning methods-k-means and k-mediods,			CO1,CO2,CO3
	C	Hierarchical Methods-Agglomerative and divisive, Density based methods- DBSCAN			CO1,CO2,CO3
	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 and implement classical algorithms in data mining and data warehousing.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:** To assess the strengths and weaknesses of the algorithms.	PO1, PO3, PO4, PSO2
3.	**CO3:** To identify the application area of algorithms, and apply them.	PO1,PO2,PO3,PO4
4.	**CO4:** To integrating and interpreting the data sets and improving effectiveness, efficiency and quality for data analysis.	PO9, PO10,PO11, PSO5

PO and PSO mapping with level of strength for Course Name Data Mining and Knowledge Discovery

	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	PSO 4	PSO 5

	CO 1	3	3	3	3	--	--	--	2	2	1	2	1	3	2	2	1	2
	CO 2	3	2	3	3	--	--	--	2	2	2	1	1	2	3	2	1	2
	CO 3	3	3	3	3	--	--	--	1	1	1	3	2	3	2	1	1	1
	CO 4	2	2	2	2	1	--	--	2	3	3	3	1	2	2	2	1	3

School: SET		**Batch : 2019**	
Program: MSc		**Current Academic Year: 2019-20**	
Branch: CS		**Semester: IV**	
1	Course Code	MCT 214	Course Name
2	Course Title	**Cloud Computing**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Elective	
5	Course Objective	• Provide students with an overview of the fundamental concepts of Cloud Computing. • Gain insight into the challenges and limitations Models of cloud computing. • To learn the various technologies of the cloud computing paradigm and learn about recent advances in Cloud Computing and enabling technologies. • Prepare students for research in the area of cloud Computing risks and cloud security challenges. • Enhance students communication and problem solving skills	
6	Course Outcomes	Students will be able to: **CO1:** To understand the cloud computing Concepts. **CO2:**Explain how and why this paradigm came about and the influence of several enabling technologies like Virtualization (e.g. VMware) and Google file systems **CO3:**Build cloud based applications using MS Azure, Amazon AWS and/or Google App Engine. **CO4:**Understanding of Cloud Computing risk issues and Cloud security challenges.	
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	**Introduction Cloud Computing**	
	A	Introduction to distributed systems, Defining Cloud Computing, Understanding of Cloud Architecture: Composability, Infrastructure, Platform, Virtual Appliances, Communication Protocols, Applications, Understanding Services: SaaS, PaaS, IaaS	CO1, CO2
	Unit 2	**Understanding Abstraction and Virtualization**	
	A	Advanced Load Balancing, the Google Cloud, Virtual machine types, VMware vSphere, Understanding Machine Imaging, Porting Applications. **Storage in the Cloud:**	CO1, CO2,CO4

		Google file system.	
	Unit 3	**Cloud Computing with the Titans**	
	A	Google Web Services: Google app Engine, Google Web Toolkit. Amazon: Amazon Elastic Cloud Computing, Amazon Simple Storage System, Amazon Block Store (EBS).	CO1,CO2,CO3
	Unit 4	**Cloud Computing Risk Issues**	
	A	The CIA Triad: Confidentiality, Integrity, And Availability. Privacy and Compliance: PCI DSS, Information Privacy and Privacy law. Common Threats and Vulnerability: Logon Abuse, Inappropriate System Use, Eavesdropping, Denial-of-service (DoS) Attack, Session Hijacking Attack. Cloud Service Provider (CSP) Risks: Back Door, Spoofing, Replay Attack, Social Engineering Attack, Dumpster Diving, Trojan Horse and Malware.	CO1,CO2,CO3
	Unit 5	**Cloud Computing Security Challenges**	
	A	Security Policy Implementation, Policy Types: Senior Management Statement of Policy, Regulatory Policies, Advisory Policies, And Informative Policies.	CO1,CO2,CO3
	Mode of examination	Theory	
	Weightage Distribution	CA	MTE
		30%	20%
	Text book/s* Other References	1. Barrie Sosinsky "*Cloud Computing (Bible)"*,Wiley 2. Anthony T.Velte, Toby J. Velte, Robert Elsenpeter"Cloud Computing: A Practical Approach" TATA McGRAW-HILL Edition. 3. 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.	**CO1:** To understand and implement classical algorithms in data mining and data warehousing.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:** To assess the strengths and weaknesses of the algorithms.	PO1, PO3, PO4, PSO2
3.	**CO3:** To identify the application area of algorithms, and apply them.	PO1,PO2,PO3,PO4
4.	**CO4:** To integrating and interpreting the data sets and improving effectiveness, efficiency and quality for data analysis.	PO9, PO10,PO11, PSO5

PO and PSO mapping with level of strength for Course Name Cloud Computing

CSE	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