ANNEXURE 5

Program and Course Structure
Master in Computer Application (MCA)

School of Engineering and Technology
MCA-Master in Computer Application
Batch: 2018 Onwards

TERM: I

S. No.	Paper ID	Subject Code	Subjects	Teaching Load			Credits	Remarks
				L	T	P		
THEORY SUBJECTS								
1.	16000	MCA161	Introduction to C Programming	3	1	0	4	NEW
2.	16001	MCA162	Digital Electronics	3	0	0	3	NEW
3.	16002	MCA163	Fundamental of Information Technology	3	0	0	3	NEW
4.	30739	MTH133	Mathematical Foundation of computer science	3	1	0	4	NEW
5.	15987	FEN101	Functional English Beginners-I	0	0	2	1	
	15988	FEN103	Functional English Intermediate-I					
Practical/Viva-Voce/Jury								
1.	16003	MCP161	Introduction to C Programming Lab	0	0	2	1	
2.	16004	MCP162	Digital Electronics Lab	0	0	2	1	
3.	15228	ENP 102	Functional English-I Lab	0	0	2	1	
TOTAL CREDITS							**18**	

School of Engineering and Technology
MCA-Master in Computer Application
Batch: 2018 Onwards
TERM: II

S. No.	Paper ID	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
				L	T	P		
THEORY SUBJECTS								
1.		MCA164	Object oriented programming with JAVA	3	1	0	4	
2.		MCA165	System Analysis and Design	3	0	0	3	
3.		MCA166	Computer Organization and Architecture	3	0	0	3	
4.		MTH128	Numerical Analysis	3	0	0	3	
5.		HMM207	Management Concepts & Practices	3	0	0	3	
6.		FEN102	Functional English Beginners-II	0	0	2	1	
		FEN104	Functional English Intermediate-II					
Practical/Viva-Voce/Jury								
1.		MCP164	Object oriented programming with JAVA Lab	0	0	2	1	
2.		MTH153	Numerical Analysis Lab	0	0	2	1	
3.		ENP 103	Functional English-I I Lab	0	0	2	1	
TOTAL CREDITS							**20**	

School of Engineering and Technology
MCA-Master in Computer Application
Batch: 2018 Onwards
TERM: III

S. No.	Paper ID	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
				L	T	P		
THEORY SUBJECTS								
1.		MCA261	JAVA Programming	3	0	0	3	OOPS
2.		MCA262	Introduction to Computer Networks	3	0	0	3	
3.		MCA263	Principles of Database Management Systems	3	0	0	3	
4.		MCA264	Operating System Concept	3	0	0	3	
5.		MCA265	Data Structures	3	0	0	3	
Practical/Viva-Voce/Jury								
6.		MCP261	JAVA Programming Lab	0	0	2	1	
7.		MCP262	Introduction to Computer Networks Lab	0	0	2	1	
8.		MCP263	Principles of Database Management Systems Lab	0	0	2	1	
9.		MCP 264	Operating System Concept Lab	0	0	2	1	
10.		MCP265	Data Structures Lab	0	0	2	1	
11.		ARP203	Aptitude Reasoning and Business Communication Skills-Basic	0	0	4	2	
TOTAL CREDITS							**22**	

School of Engineering and Technology
MCA-Master in Computer Application
Batch: 2018 Onwards
TERM: IV

S. No.	Paper ID	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
				L	T	P		
THEORY SUBJECTS								
1.		MCA266	Software Engineering Principles	3	0	0	3	
2.		MCA267	Design and analysis of algorithms	3	1	0	4	
3.		MCA270	Computer Graphics and Animation	3	1	0	4	
4.			Program Elective -1	3	0	0	3	
5.			Program Elective -2	3	0	0	3	
Practical/Viva-Voce/Jury								
6.		ARP204	Aptitude Reasoning and Business Communication Skills-Intermediate	0	0	4	2	
7.		MCP267	Design and analysis of algorithms Lab	0	0	2	1	
8.		MCP270	Computer Graphics and Animation Lab	0	0	2	1	
TOTAL CREDITS							**21**	

School of Engineering and Technology

MCA-Master in Computer Application
Batch: 2018 Onwards
TERM: V

S. No.	Paper ID	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
				L	T	P		
THEORY SUBJECTS								
1.		MCA361	Python Programming Concepts	3	0	0	3	
2.		MCA362	Web and its Applications	3	0	0	3	
3.			Program Elective-3	3	0	0	3	
4.			Program elective-4	3	0	0	3	
5.		ENG401	Writing for Technical Purpose	3	0	0	3	
Practical/Viva-Voce/Jury								
6.		ARP301	Quantitative Aptitude Behavioral and Interpersonal Skills	0	0	4	2	
7.		MCP361	Python Programming Concepts Lab	0	0	2	1	
8.		MCP362	Web and its Applications Lab	0	0	2	1	
9.		MCP301	Mini Project	0	0	2	1	
TOTAL CREDITS							**20**	

School of Engineering and Technology
MCA-Master in Computer Application
Batch: 2018 Onwards
TERM: VI

S. No.	Paper ID	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite
				L	T	P		
THEORY / Practical SUBJECTS								
1.		MCA354	Seminar	0	0	8	4	
2.		MCA356	Project	0	0	30	15	
TOTAL CREDITS							**19**	

Program Elective			
Advanced Database Management Systems MCA268	Data Mining & Knowledge discovery MCA273	Business Intelligence MCA363	Big Data Analytics MCA366
Mobile Technologies MCA269	Cloud Computing MCA271	Cryptography and Network Security MCA364	Cyber Laws MCA367
	Android Application Development MCA272	Software Project Management MCA365	Software Testing MCA368

School: SET		**Batch : 2018**	
Program: MCA		**Current Academic Year:**	
Branch:		**Semester: I**	
1	Course Code	**MCA 161** Course Name: Programming in C	
2	Course Title	Introduction to C Programming	
3	Credits	5	
4	Contact Hours (L-T-P)	3-1-2	
	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	CO3

		reference.			
	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 Introduction to C Programming (Course Code MCA161)

	COs	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	PSO2	PSO3	PSO4	PSO5
CSE107	CO1	3	2	3	-	-	-	-	-	-	-	2	1	3	2	2	1	2
	CO2	3	2	3	-	-	-	-	-	-	-	2	1	3	2	2	1	2
	CO3	3	2	3	-	-	-	-	-	-	-	1	1	2	3	2	1	2
	CO4	3	2	3	-	-	-	-	-	-	-	3	2	3	2	1	1	1
	CO5	3	2	3	-	-	-	-	-	-	-	3	1	2	2	2	1	3

School: SET		**Batch :2018**
Program: MCA		**Current Academic Year:**
Branch:NA		**Semester:**
1	Course Code	MCA162 | Course Name: Digital Electronics
2	Course Title	**Digital Electronics**
3	Credits	4
4	Contact Hours (L-T-P)	3-0-2
	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 : 2018**
Program: MCA		**Current Academic Year: 2018-19**
Branch:		**Semester: I**
1	Course Code	MCA163 | Course Name-
2	Course Title	**Fundamentals of IT**
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	
5	Course Objective	1. The main objective is to introduce IT in a simple language to all undergraduate students, regardless of their specialization. 2. The focus of the subject is on introducing skills relating to IT basics, computer applications, programming, interactive medias, Internet basics etc.
6	Course Outcomes	Students will be able to: **CO1:** To understand personal computers and their operations. **CO2:**be able to identify computer hardware components and describe their function; **CO3:** Understand basic concepts and terminology of information technology. **CO4:** Understand basic concepts and working of internet
7	Course	The course Fundamentals of Information Technology has become essential the

	Description	present age of computer technology and information, as the applications of information technology can be found in all aspects of our lives.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Computers**	
	A	Introduction, Definition, .Characteristics of computer, Evolution of Computer	CO1
	B	Block Diagram Of a computer, Generations of Computer, Classification Of Computers,	CO1, CO2
	C	Applications of Computer, Capabilities and limitations of computer.	CO1, CO2
	Unit 2	**Basic Computer Organization:**	
	A	Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types	CO1, CO2
	B	Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types	CO1, CO2
	C	Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.	CO1, CO2
	Unit 3	**Storage**	
	A	Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM	CO1,CO2
	B	Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives. Software and its needs, Types of S/W.	CO1,CO2
	C	System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w.	CO2
	Unit 4	**Information Technology Basics**	
	A	Information Technology Basics, Introduction, Need for Information Storage and Processing	CO1,CO2,CO3
	B	Information Technology Components, Role of Information Technology,	CO1,CO2,CO3
	C	Information Technology and the Internet	CO1,CO2,CO3
	Unit 5	**Internet**	
	A	Internet and its Tools, Internet Evolution, Basic Internet Terminology,Data over Internet, Modes of Data Transmission,	CO1,CO2,CO4
	B	Types of Networks, Types of Topologies, Protocols used in the Internet, Getting Connected to Internet Applications, Internet Applications, Computer Ethics, Emerging Trends in IT	CO1,CO2,CO4
	C	Electronic Commerce (E-Commerce), Electronic Data	CO1,CO3,CO4

		Interchange (EDI),Smart Cards, Mobile Communication, Internet Protocol TV			
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	3. Computer Fundamentals by P.K.Sinha			
	Other References	1.			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:** Have a basic understanding of personal computers and their operations.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:**	PO1, PO3, PO4, PSO2
3.	**CO3:** Understand basic concepts and terminology of information technology.	PO1,PO2,PO3,PO4
4.	**CO4:**	PO9, PO10,PO11, PSO5

PO and PSO mapping with level of strength for Course Name Fundamentals of IT (Course Code MCA153)

	COs	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	PSO2	PSO3	PSO4	PSO5
C S E	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																	
	CO4																	

School: SET		**Batch: 2018**
Program: MCA		**Current Academic Year: 2018-19**
Branch: CSE		**Semester: I**
1	Course Code	MCP 161
2	Course Title	Programming in C Lab
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2

	Course Status	Compulsory	
5	Course Objective	4. Learn basic programming constructs –data types, decision structures, control structures in C 5. learning logic aptitude programming in c language 6. 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 examination	Practical	
	Weightage Distribution	CA: 60% / MTE: 0% / ETE: 40%	
	Text book/s*	Kernighan, Brian, and Dennis Ritchie. *The C Programming Language*	
	Other References	4. B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004.	

		5. 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 : 2018**	
Program: MCA		**Current Academic Year: 2018-2019**	
Branch:		**Semester: I**	
1	Course Code	MCA121	Course Name
2	Course Title	**Mathematical Foundation of Computer Science**	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status		
5	Course Objective	Fundamental concepts and tools in discreet mathematics with emphasis on their applications to computer science	
6	Course Outcomes	Students will be able to: **CO1:**understanding the role and importance of proof in mathematics, as well as the concept of the importance of assumptions in the proof **CO2:**knowledge of the concepts and methods of mathematical logic, set theory, relation calculus, and concepts concerning functions which are included in the fundamentals of various disciplines of mathematics, Student will be able to comprehend mathematical principles and logic **CO3:**Formulate Minimized Finite Automata for regular Languages. **CO4:**To understand the structure and dynamics of mathematics such as axioms, definitions, theorems, proofs, and to learn the fundamental proof strategies in mathematics, such as proof by contrapositive, proof by contradiction.	

7	Course Description	This course will discuss fundamental concepts and tools in discrete mathematics with emphasis on their applications to computer science. Example topics include logic and Boolean circuits; sets, functions, relations, and finite automata, regular expression.			
8	Outline syllabus				CO Mapping
	Unit 1	**Set Theory**			
	A	Combination of sets, Multisets, Ordered pairs, Set Identities. Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Order of relations.			CO1, CO2
	B	Functions: Definition, Classification of functions, Operations on functions, Recursively defined functions.			CO1, CO2
	C	Partial order sets, Combination of partial order sets, Hasse diagram.			CO1, CO2
	Unit 2	**Algebraic structure**			
	A	Groups, Properties of groups, semi-group, monoid group.			CO1, CO2,CO4
	B	Abelian group, sub group, cyclic group, normal sub group, permutation groups and Symmetric groups			CO1, CO2,CO4
	C	Definition and elementary propertiesof Rings and Fields, Integers Modulo n.			CO1, CO2,CO4
	Unit 3	**Propositional Logic**			
	A	Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction.			CO1,CO2
	B	Principle of substitution, logical equivalence, arguments-valid and fallacy arguments, rules of inferences, duality law			CO1,CO2
	C	Connectives- Exclusive OR' NAND and NOR connective, prepositional functions & quantifiers, normal forms.			CO1,CO2
	Unit 4	**Finite Automata**			
	A	Introduction to languages, Kleene closures, Finite Automata (FA), Transition graph, Nondeterministic finite Automata (NFA), Deterministic finite Automata (DFA).			CO3,CO4
	B	Equivalence of NDFA and DFA, Construction of DFA from NFA.			CO3,CO4
	C	Optimization of Finite Automata.			CO3,CO4
	Unit 5	**Regular Expression and Finite Automata**			CO3,CO4
	A	Regular Expression, Finite Automata with null move, Regular Expression to Finite Automata.			CO3,CO4
	B	Arden Theorem			CO3,CO4
	C	Applications and Limitation of FA. (FAT tool).			CO3,CO4
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	

	Text book/s*	1. Liu and Mohapatra, "Elements of Distcrete Mathematics", McGraw Hill 2. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science(Automata, Languages and Computation)", PHI	
	Other References	Internet as the resource for reference	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:** understanding the role and importance of proof in mathematics, as well as the concept of the importance of assumptions in the proof	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:** knowledge of the concepts and methods of mathematical logic, set theory, relation calculus, and concepts concerning functions which are included in the fundamentals of various disciplines of mathematics, Student will be able to comprehend mathematical principles and logic	PO1, PO3, PO4, PSO2
3.	**CO3:**Formulate Minimized Finite Automata for regular Languages.	PO1,PO2,PO3,PO4
4.	**CO4:** To understand the structure and dynamics of mathematics such as axioms, definitions, theorems, proofs, and to learn the fundamental proof strategies in mathematics, such as proof by contrapositive, proof by contradiction.	PO9, PO10,PO11, PSO5

PO and PSO mapping with level of strength for Course Name Mathematical Foundation of Computer Science (Course Code MCA120)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
MCA120 CO1	3	3	3	3	--	--	--	2	2	1	2	1	3	2	2	1	2
CO311 CO2	3	2	3	3	--	--	--	2	2	2	1	1	2	3	2	1	2
MCA1	3	3	3	3	--	--	--	1	1	1	3	2	3	2	1	1	1

20 CO3																	
MCA120 CO4	2	2	2	2	1	--	--	2	3	3	3	1	2	2	2	1	3

School:SET		**Batch : 2018**		
Program: MCA		**Current Academic Year: 2018-19**		
Branch:		**Semester: II**		
1	Course Code	MCA164	Course Name	
2	Course Title	Object Oriented Programming with Java		
3	Credits	5		
4	Contact Hours (L-T-P)	3-1-2		
	Course Status	PG		
5	Course Objective	**1.**GainknowledgeaboutbasicJavalanguagesyntaxandsemanticstowrite Javaprogramsandus e conceptssuchasvariables,conditionalanditerativeexecutionmethodsetc. **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. Identifyclasses,objects,membersofaclassandrelationshipsamong them needed for a specificproblem. 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 implementation*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,ArchitectureofJVM,ClassLoader		CO1, CO2,CO3

		ExecutionEngine,Garbage collection.			
	Unit 2	**Introduction to Java**			
	A	JavadevelopmentKit(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. Identifyclasses,objects,membersofaclassandrelationshipsamong them needed for a specificproblem.	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 OOPs using java (Course Code MCA164)

COs	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	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

School: SET		**Batch: 2018**
Program: MCA		**Current Academic Year:**
Branch:		**Semester: II**
1	Course Code	MCP164
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 Distribution	CA	MTE	ETE	
		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 : 2018**	
Program: MCA		**Current Academic Year: 2018-19**	
Branch:		**Semester: II**	
1	Course Code	MCA165	Course Name MCA
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,	CO1,CO2,CO3

		Design Specifications,			
	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 Distributed System (Course Code MCA165)

	COs	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	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

School: SET		**Batch : 2018**	
Program: MCA		**Current Academic Year: 2018-2019**	
Branch: CS		**Semester: II**	
1	Course Code	MCA166 | 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	CO1, CO2,CO3

		multiplication, Booth algorithm			
	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 execute etc), interrupt: Types and cycle.			CO1,CO2,CO3
	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 MCA166)

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 : 2018**	
Program:MCA		**Current Academic Year:**	
Branch:		**Semester: III**	
1	Course Code	MCA261 Course Name	
2	Course Title	Java Programming	
3	Credits	4	
4	Contact Hours (L-T-P)	3-0-2	
	Course Status	UG	
5	Course Objective	Objective of this course is to provide the ability to design console based, GUI based and web based applications. Students will also be able to understand integrated development environment to create, debug and run multi-tier and enterprise-level applications	
6	Course Outcomes	Students will be able to: **CO1:**Develop Swing-based GUI **CO2**:Develop client/server applications and TCP/IP socket programming **CO3**Update and retrieve the data from the databases using SQL **CO4**Develop distributed applications using RMI **CO5**Develop component-based Java software using JavaBeans **CO6** Develop server side programs in the form of servlets	
7	Course Description	This ***course*** introduces computer ***programming*** using the ***JAVA programming*** language with object-oriented ***programming*** principles. Emphasis is placed on event-driven ***programming*** methods, including creating and manipulating objects, classes, and using object-oriented tools such as the ***class***debugger.	
8	Outline syllabus		CO Mapping

	Unit 1	**GUI Programming**			
	A	Introduction to AWT: Layout managers, AWT and Swing components,Menu, Submenu			CO1, CO2
	B	DialogEvent handling: Action Events, Mouse Events, Keyboard Events, Window Events, Listeners			CO1, CO2
	C	The Delegation Model of Event Handling, Adapter Classes Java applet: life cycle, Implementation.			CO1, CO2, CO6
	Unit 2	**Data Base Connectivity**			
	A	Introduction to JDBC: JDBC API, java.sql package, JDBC Drivers and ArchitectureDatabase connectivity Implementation.			CO1, CO2,CO4
	B	Creating and Accessing Database: Creating tables, Retrieving values, Inserting, Updating and deleting records			CO1, CO2,CO4
	C	Using Prepared statement, Callable statement, Transactions, Metadata, Handling SQL Exceptions.			CO1, CO2,CO4
	Unit 3	**Network Programming**			
	A	Sockets: Introduction, Application, TCP socket and UDP socket Implementation			CO1,CO2,CO3
	B	Client and Server sockets, data transmission over socket			CO1,CO2,CO3
	C	Introduction to RMI, RMI Architecture, Registry server, RMI server and RMI client			CO4, CO6
	Unit 4	**Servlets**			
	A	Servlet: Overview and Architecture, Life Cycle, Servlets Interface , Javax.servlet and javax.servlet.http package, Implementing and Deploying Servlets, Exploring Develoyment Descriptor (web.xml) **.**Handling Client HTTP Request & Server HTTP Response			CO1,CO2,CO3
	B	Redirecting Requests to Other Resources, Initializing Parameters & ServletContext, Initializing a Servlet, Session Management, Request Dispatcher and Redirecting			CO1,CO2,CO3
	C	, Session Tracking: Cookies, Session Tracking with HttpSession, Deployment and Database connectivity with Servlet.			CO1,CO2,CO3
	Unit 5	**Introduction to JSP**			
	A	Life cycle of JSP, JSP API, JSP Application Design, Tomcat Server, Scripting elements, scriptlet tag, expression tag, declaration tag			CO1,CO2,CO3,CO6
	B	Implicit Objects, JSP Objects, Directive Elements, Action Elements			CO1,CO2,CO3
	C	Exception Handling, Error Pages, Database connectivity with JSP			CO1,CO2,CO3,CO6
	Mode of examination	Theory			
	Weightage	CA	MTE	ETE	

	Distribution	30%	20%	50%	
	Text book/s*	1.Balagurusamy E, "Programming in JAVA", TMH			
	Other References	3. Schildt H, "The Complete Reference JAVA2", TMH 4. Schildt H, "The Complete Reference J2EE", TMH 5. Professional Java Programming:BrettSpell,WROX Publication			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:**Develop Swing-based GUI	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:**Develop client/server applications and TCP/IP socket programming	PO1, PO3, PO4, PSO2
3.	**CO3:**Update and retrieve the data from the databases using SQL	PO1,PO2,PO3,PO4
4.	**CO4:**Develop distributed applications using RMI	PO9, PO10,PO11, PSO5
5.	**CO5**Develop component-based Java software using JavaBeans	PO1,PO2,PO3,PO4
6.	**CO6** Develop server side programs in the form of servlets	PO1, PO3, PO4, PSO2

PO and PSO mapping with level of strength for Course Name Java Programming(Course Code MCA261)

E	Cos	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	PSO2	PSO3	PSO4	PSO5
	CO1	3	3	3	3	--	--	--	2	2	1	2	1	3	2	2	1	2
	CO2	3	2	3	3	--	--	--	2	2	2	1	1	2	3	2	1	2
	CO3	3	3	3	3	--	--	--	1	1	1	3	2	3	2	1	1	1
	CO4	2	2	2	2	1	--	--	2	3	3	3	1	2	2	2	1	3
	CO5	3	3	3	3	--	--	--	2	2	1	2	1	3	2	2	1	2
	CO6	3	2	3	3	--	--	--	2	2	2	1	1	2	3	2	1	2

School: SET		**Batch :2018**
Program: MCA		**Current Academic Year: 2018-19**
Branch:MCA 262		**Semester:3**
1	Course Code	MCA262 | Course Name: MCA
2	Course Title	**Introduction to Computer Networks**
3	Credits	4
4	Contact Hours	3-0-2

	(L-T-P)		
	Course Status	Compulsory	
5	Course Objective	3. Provide students with an overview of networking 4. Gain insight into the issues, challenges and work at all level of reference models 5. Provide the students with practice on applying network design 6. 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*	2. 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

PO and PSO mapping with level of strength for Course Name Java Programming (Course Code MCA262)

	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:		**Batch : 2018**	
Program:MCA		**Current Academic Year:**	
Branch:		**Semester: 3**	
1	Course Code	MCA-263 Course Name	
2	Course Title	Principles of Database Management Systems	
3	Credits	4	
4	Contact Hours (L-T-P)	3-0-2	
	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 databaseand 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 decompositions			CO4,CO2
	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*	6. 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 data Base Management Systems (Course Code MCA263)

	Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
MCA	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: 2018**	
Program: MCA		**Current Academic Year:**	
Branch:		**Semester: III**	
1	Course Code	MCP263	
2	Course Title	Data Base Management System 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 examination	Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1. Korth , Silberschatz& Sudarshan, Data base Concepts, Tata McGraw-Hill			
	Other References	3. Elmasri, Navathe, Fundamentals of Database Systems, Pearson Education Inc. 4. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to design, Implementation and Management, Pearson Education, Latest Edition. 5. Jeffrey D. Ullman, Jennifer Windon, A first course in Database Systems, Pearson Education.			

School: SET		**Batch : 2018**
Program: MCA		**Current Academic Year: 2018-19**
Branch:		**Semester: III**
1	Course Code	MCA264 Course Name
2	Course Title	Principles of Operating Systems
3	Credits	3
4	Contact Hours(L-T-P)	3-0-0
	Course Status	Non Elective
5	Course Objective	1. This course introduces the challenges for designing the operating systems. 2. Includes different design principles and algorithms. 3. Evaluation of algorithms proposed. 4. Implementation of algorithms and utilities.
6	Course Outcomes	Students will be able : **CO1:** To identify the challenges and apply suitable algorithms for them.

		CO2: To assess the strengths and weaknesses of the algorithms. **CO3:** To understand and implement algorithms in resource allocation and utilization. **CO4:** To integrate and interpret effectiveness, efficiency of algorithms used for resource management of operating systems.			
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*	7. 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 Principles of Operating System(Course Code MCA264)

E	COs	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	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

School: SET		**Batch :** 2018-2020
Program: MCA		**Current Academic Year:** 2018-19
Branch:		**Semester:**III
1	Course Code	MCA265
2	Course Title	Data Structures
3	Credits	5
4	Contact Hours (L-T-P)	3-1-2
	Course Status	Core
5	Course	1. Learn the basicconcepts of Data Structures and algorithms.

	Objective	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 matrices.	CO1, CO2
	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	CO3, CO6

		Expressions, Evaluation of postfix expression using stack.			
	B	Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty.			CO3, CO6
	C	Circular queue, Deque, 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 (MCA265**)**

Course Code	Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
	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: 2018-2020**
Program: MCA		**Current Academic Year: 2018-19**
Branch:		**Semester: III**
1	Course Code	MCP 265
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: 2018**
Program: MCA		**Current Academic Year:**
Branch:		**Semester: III**
1	Course Code	MCP 261
2	Course Title	Java Programming 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 provide the ability to design console based, GUI based and web based applications. Students will also be able to understand integrated development environment to create, debug and run multi-tier and enterprise-level applications
6	Course	Students will be able to:

	Outcomes	CO1: Develop Swing-based GUI CO2:Develop client/server applications and TCP/IP socket programming CO3Update and retrieve the data from the databases using SQL CO4Develop distributed applications using RMI CO5Develop component-based Java software using JavaBeans CO6 Develop server side programs in the form of servlets.			
7	Course Description	This course introduces computer programming using the JAVA programming language with object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the classdebugger.			
8	Outline syllabus				CO Mapping
	Unit 1	**Practical based on AWT and swings**			CO1,CO2,CO5
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 2	**Practical based on JDBC connectivity**			CO1, CO2,CO5
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 3	**Practical based on network programming**			CO1, CO2,CO3
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 4	**Practical based on servlet implementation**			CO1, CO2,CO6
		Sub unit - a, b and c detailed in Instructional Plan			
	Unit 5	**Practical based on JSP implementation**			CO1,CO5,CO6
		Sub unit - a, b and c detailed in Instructional Plan			
	Mode of examination	Practical			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	1.Balagurusamy E, “Programming in JAVA”, TMH			
	Other References	6. Schildt H, “The Complete Reference JAVA2”, TMH 7. Schildt H, “The Complete Reference J2EE”, TMH Professional Java Programming:BrettSpell,WROX Publication			

School: SET		**Batch: 2018-2021**
Program: MCA		**Current Academic Year: 2018-2019**
Branch:		**Semester: 3**
1	Course Code	MCP 262
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: SET		Batch:	
Program: MCA		Current Academic Year:	
Branch:		Semester: 3	
1	Course Code	MCP 263	
2	Course Title	Principles of Data Base Management System 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 examination	Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	2. Korth , Silberschatz& Sudarshan, Data base Concepts, Tata McGraw-Hill			
	Other References	7. Elmasri, Navathe, Fundamentals of Database Systems, Pearson Education Inc. 8. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to design, Implementation and Management, Pearson Education, Latest Edition. 9. Jeffrey D. Ullman, Jennifer Windon, A first course in Database Systems, Pearson Education.			

School: SET		**Batch : 2018**
Program: MCA		**Current Academic Year: 2018-2019**
Branch: MCA		**Semester:** 4
1	Course Code	MCA266 | Course Name
2	Course Title	Software Engineering Principles
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Core
5	Course Objective	7. Provide students with an overview of the Software development life cycle for software development methodologies. 8. Provide students with insights on requirement gathering activities. 9. Provide the students with design methodology practices. 10. Gain Insights about testing techniques. 11. 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 design,			CO3
	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 suites.	PO1,PO2,PO3,PO4, PO6, PO9, PO11, PO12
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 Principles**(Course Code MCA266)**

Cos	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	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 : 2018**
Program:MCA		**Current Academic Year: 2018-19**
Branch:		**Semester: 4**
1	Course Code	MCA267 | Course Name
2	Course Title	Design and Analysis of Algorithms
3	Credits	5
4	Contact Hours (L-T-P)	3-1-2
	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 Multiplication, 0/1 Knapsack Problemrecords	CO1, CO2, CO4
	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*	8. Cormen et al., "Introduction of Computer Algorithms", Prentice Hall India			
	Other References	8. Sahni et al., "Fundamentals of Computer Algorithms", Galgotia Publications. 9. 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 Algorithm (Course Code MCA268)

Cos	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	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

School: SET		**Batch: 2018**			
Program: MCA		**Current Academic Year: 2018-19**			
Branch:		**Semester: 4**			
1	Course Code	MCP 267			
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 : 2018**	
Program: MCA		**Current Academic Year: 2018-2019**	
Branch:		**Semester: 4**	
1	Course Code	MCA270 | Course Name	
2	Course Title	**Computer Graphics and Animation**	
3	Credits	5	
4	Contact Hours (L-T-P)	3-1-2	
	Course Status		
5	Course Objective	This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends. A thorough introduction to computer graphics techniques, focusing on 3D modeling, image synthesis, and rendering.	
6	Course Outcomes	Students will be able to: **CO1:**Understand the technology requirement for graphics system. **CO2:**Construct various object to create various application. **CO3:**Formulate proficiency in 2D and 3D computer graphics API programming. **CO4:**Apply in-depth knowledge of display systems, image synthesis, shape modeling, and interactive control of 3D computer graphics applications.	
7	Course Description	Computer Graphics I is a study of the hardware and software principles of interactive raster graphics. Topics include an introduction to the basic concepts, 2-D and 3-D modeling and transformations, viewing transformations, projections, rendering techniques, graphical software packages and graphics systems.	
8	Outline syllabus		CO Mapping
	Unit 1	**Graphic System Primitives**	
	A	Display devices, Input and Output Devices. Output Primitives: Points and Lines, Pixels, Pixel addressing and Object Geometry, Planes, Frame buffers, vector and character generation	CO1, CO2
	B	Line-Drawing Algorithms-DDA and Brenham's algorithms. Circle-Generating algorithms	CO1, CO2,CO3
	C	Scan-Line, Polygon Fill algorithms, Boundary Fill and Flood-Fill Algorithms	CO1, CO2,CO3
	Unit 2	**Transformations**	
	A	Basic Transformations, Composite Transformations	CO1,

					CO2,CO3
	B	General Fixed-Point Scaling, Other Translations- Reflection, Shear			CO1, CO2,CO3
	C	Transformations between Coordinate Systems, Raster Methods for Transformations			CO1, CO2,CO3
	Unit 3	**Windowing and Clipping And 3D Transformation**			
	A	Window, Viewport, Window-To-Viewport Coordinate transformation, zooming and panning, Clipping Operations, Point Clipping, Line Clipping- Cohen-Sutherland Line Clipping, Cohen-Sutherland Line Clipping Algorithm, Midpoint Subdivision Line Clipping Algorithm, Cyrus Beck clipping			CO2,CO3,CO4
	B	3-D transformation: Translation, Rotation, Scaling, Shearing, Reflecting			CO2,CO3,CO4
	C	Composite Transformations, Rotation about an arbitrary line, Reflection through an arbitrary plane.			CO2,CO3,CO4
	Unit 4	**Parallel Projections & Hidden surface Removal**			
	A	Orthographic Projections, Oblique Projections, Parallel Projections			CO2,CO3,CO4
	B	Perspective Projections, One Point, Two, Three Point vanishing points			CO2,CO3,CO4
	C	Back Face Detection, Depth Buffer Method, Depth Sorting Method (Painter's algorithm)			CO2,CO3,CO4
	Unit 5	**Spline Curves , Surfaces and Animation**			
	A	Parametric Continuity, Cubic Spline Interpolation, Natural cubic splines, Hermite Interpolation Cubic Spline approximations			CO2,CO3,CO4
	B	Bezier Curves and Surfaces, B-Spline, Uniform periodic curve, cubic periodic curve			CO2,CO3,CO4
	C	Introduction to Animation, Principles of Animation, Types of Animation.			CO2,CO3,CO4
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1. J. Foley, V. Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, Latest Edition.			
	Other References	1. D. Rogers, J. Adams, "Mathematical Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill Publication, Latest Edition. 2.Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002. 3.D. Rogers, "Procedural Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill			

		Publication, Latest Edition.	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:**Understand the technology requirement for graphics system.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:**Construct various object to create various application.	PO1, ,PO3, PO4, PSO2
3.	**CO3:**Formulate proficiency in 2D and 3D computer graphics API programming.	PO1,PO2,PO3,PO4,PO11,PS11
4.	**CO4:**Apply in-depth knowledge of display systems, image synthesis, shape modeling, and interactive control of 3D computer graphics applications.	PO10,PO11, PSO5

PO and PSO mapping with level of strength for Course Name Computer Graphics and Animation(Course Code MCA270)

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

School:		**Batch: 2018**
Program:		**Current Academic Year: 2018-2019**
Branch:		**Semester:IV**
1	Course Code	MCP 270
2	Course Title	**Computer Graphics and Animation Lab**
3	Credits	1
4	Contact Hours	0-0-2

	(L-T-P)		
	Course Status	Compulsory/Elective	
5	Course Objective	• This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends. A thorough introduction to computer graphics techniques, focusing on 3D modeling, image synthesis, and rendering.	
6	Course Outcomes	Students will be able to: **CO1:**Understand the technology requirement for graphics system. **CO2:**Construct various object to create various application. **CO3:**Formulate proficiency in 2D and 3D computer graphics API programming. **CO4:**Apply in-depth knowledge of display systems, image synthesis, shape modeling, and interactive control of 3D computer graphics applications.	
7	Course Description	Computer Graphics I is a study of the hardware and software principles of interactive raster graphics. Topics include an introduction to the basic concepts, 2-D and 3-D modeling and transformations, viewing transformations, projections, rendering techniques, graphical software packages and graphics systems.	
8	Outline syllabus		CO Mapping
	Unit 1	**Graphics Systems Premitives**	
	A	Drawing of line & basic shapes using-in-built functions	
	B	Implementation of object drawing algorithm (Line,circle,etc).	
	C	Implementation of color filling algorithms.	
	Unit 2	**2D Transformation**	
	A	Implementation of 2D transformation methods,	
	B	Implementation of composite transformation methods.	
	C	Implementation of composite transformation about certain points.	
	Unit 3	**3D Transformation**	
	A	Implementation of 3D transformation methods,	
	B	Implementation of composite transformation methods.	
	C	Implementation of clipping algorithms	
	Unit 4	**Projections and Hidden Surface Removal**	
	A	Implementation of various projection methods.	
	B	Implementation of hidden surface removal algorithms.	
	C	Implementation of z-Buffer Algorithm.	
	Unit 5	**Animation**	

	A	Uses of inbuilt functions for animation.			
	B	One menu driven project for animation.			
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		60%	0%	40%	
	Text book/s*	-			
	Other References				

School: SET		**Batch :2018**	
Program: MCA		**Current Academic Year: 2018-19**	
Branch:		**Semester: 4**	
1	Course Code	MCA268	Course Name
2	Course Title	**Advance Data base Management System**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	DE 1	
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*	9. Korth ,Silberschatz& Sudarshan, Data base Concepts, Tata McGraw-Hill 10. Elmasri, Navathe, Fundamentals of Database Systems, Pearson Education Inc.			

	Other References	10. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to design, Implementation and Management, Pearson Education, Latest Edition. 11. Jeffrey D. Ullman, Jennifer Windon, A first course in Database Systems, Pearson Education. 12. Date C.J., An Introduction to Database Systems, Addison Wesley. 13. 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 Advance Data base Management System(Course Code MCA268)

	Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	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 : 2018**	
Program: MCA		**Current Academic Year: 2018-19**	
Branch:		**Semester: 4**	
1	Course Code	MCA269 | Course Name:	
2	Course Title	**Mobile technologies**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Elective	
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 (Course Code MCA269)

	Cos	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	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 : 2018**	
Program: MCA		**Current Academic Year: 2018-19**	
Branch:--		**Semester: 4**	
1	Course Code	MCA273 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	12. Provide students with an overview of the methodologies and approaches to data mining 13. Gain insight into the challenges and limitations of different data mining techniques 14. Provide the students with practice on applying data mining solutions 15. Prepare students for research in the area of data mining and related applications 16. 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*	11. J.Han,M. Kamber, J. Pei *"Data Mining Concepts and Techniques"*,Edition:3 , Morgan Kaufmann			
	Other References	14. M.H. Dunham, *Data Mining Introductory and Advanced Topics*, Pearson Education. 15. Adriaans, *Data Mining*, Pearson Education 16. 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 Warehouse and Data Mining (Course Code MCA273)

	Cos	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	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

School: SET		**Batch : 2018**	
Program: MCA		**Current Academic Year: 2018-19**	
Branch:		**Semester: IV**	
1	Course Code	MCA271	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	17. Provide students with an overview of the fundamental concepts of Cloud Computing. 18. Gain insight into the challenges and limitations Models of cloud computing. 19. To learn the various technologies of the cloud computing paradigm and learn about recent advances in Cloud Computing and enabling technologies. 20. Prepare students for research in the area of cloud Computing risks and cloud security challenges. 21. 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:** Google file system.	CO1, CO2,CO4
	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	12. Barrie Sosinsky "*Cloud Computing (Bible)"*,Wiley 13. Anthony T.Velte, Toby J. Velte, Robert Elsenpeter"Cloud Computing: A Practical Approach" TATA McGRAW-HILL Edition. 14. 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 (Course Code MCA 271)

Cos	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	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

School: SET		**Batch : 2018**
Program: MCA		**Current Academic Year: 18-19**
Branch:		**Semester:IV**
1	Course Code	MCA272 | Course Name
2	Course Title	Android Application Development
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Elective
5	Course Objective	Describe the components and structure of a mobile development frameworks (Android SDK and Eclipse Android Development Tools (ADT)) and learn how and when to apply the different components to develop a working system.
6	Course Outcomes	On successful completion of the course, the student will: 5. Design App user Interface 6. Perform Event driven programming 7. Implement relational Databases on devices using SQLite 8. Examine the usage of commonly available device sensors while building

		Android App		
7	Course Description	The course will introduce concepts of the Android platform, Android application components, Activities and their lifecycle, UI design.It will also help students to build applications according to their problem statements.		
8	Outline syllabus			CO Mapping
	Unit 1	**Introduction to Android**		
	A	Android architecture, Feature of android, Limitation of mobile devices		CO1
	B	Configuration of android SDK, Activity, Activity life cycle		CO1
	C	Generation of APK file for android project, Test run of application on device		CO1
	Unit 2	**Android UI Components**		
	A	Layouts-Linear layout, Relative layout, Table layout, Frame layout		CO1,CO2
	B	Button, TextView, EditTextView, Label, List, Radio Button, Checkbox		CO1,CO2
	C	Concept of intent, configuration of intent, Intent filters		CO1,CO2
	Unit 3	**Services and Notification**		
	A	Services- states and life cycle		CO1
	B	Type of notification, Toast notification, status bar notification		CO1,CO2
	C	Creating Menu Option Menu, Context Menu		CO1,CO2
	Unit 4	**Working with SQL Lite**		
	A	Introduction to SQLite database, Steps for connecting application with database.		CO3
	B	Fetch and update data in database from application,		CO3
	C	Cursor and content value, opening and closing database		CO3
	Unit 5	**Sensor Device**		
	A	Sensor Manager, Sensor Framework, Types of Sensors		CO2,CO4
	B	Accelerometer, Gyroscope, Proximity Sensor, Orientation, Light Sensor		CO2,CO4
	C	Detect availability of sensor, Fetch data from sensors on frequent basis		CO2,CO4
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. Anubhav Pradhan and Anil V. Deshpande , Composing Mobile Apps: Learn, Explore, Apply Using Android , 1st Edition,Wiley India.		
	Other References	1. Wei-Meng Lee , Beginning Android 4 Application Development. 2. Neil Smyth ,Android Studio Development essentials-Android 6		

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:**Design App user Interface	PO4,PO5,PSO4
2.	**CO2:**Perform Event driven programming	PO3,PO5
3.	**CO3:**Implement relational Databases on devices using SQLite	PO4,PO5,PO9
4.	**CO4:**Examine the usage of commonly available device sensors while building Android App	PO5,PO7,PO12,PSO4

PO and PSO mapping with level of strength for Course Name Android Application Development (Course Code MCA272)

	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3	PSO 4
C S E	CO1	1	2	2	3	3	2	1	2	2	2	2	2	1	2	2	3
	CO2	2	2	3	2	3	1	1	2	2	2	1	2	2	2	2	2
	CO3	2	1	2	3	3	1	2	-	3	2	2	2	-	1	1	2
	CO4	2	1	1	1	3	1	3	-	2	1	2	3	-	2	1	3

School: SET		**Batch : 2018-2021**
Program: MCA		**Current Academic Year: 2018-19**
Branch:		**Semester: 5**
1	Course Code	MCA361 | Course Name
2	Course Title	Python Programming Concepts
3	Credits	3-0-2
4	Contact Hours (L-T-P)	4
	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	Python is a language with a simple syntax, and a powerful set of

	Description	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, Types of functions, Function Arguments, Anonymous functions, Global and local variables	CO3
	C	**Exception Handling**:DefinitionException, Exceptionhandling ,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*	15. The Complete Reference Python, Martin C. Brown, McGrwHill			
	Other References	17. Introduction to computing in problem solving using Python, E Balahurusamy, McGrwHill 18. Introduction to programming using Python, Y. Daniel Liang, Pearson 19. Mastering Python, Rick Van Hatten, Packet Publishing House 20. 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 Data Warehouse and Data Mining (Course Code MCA 361)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	2	1	-	-	-	1	-	1	-	2	2	1	2	3
CO2	3	3	3	3	3	-	-	-	3	-	3	-	3	3	3	3	3
CO3	3	3	3	3	2	-	-	-	3	-	2	-	3	3	2	2	2
CO4	2	2	2	1	2	-	--	-	2	-	1	-	2	1	1	2	1
CO5	1	3	1	1	2				1		2		1	2	2	1	1
CO6	2	2	2	2	3				1		2		2	1	1	2	2

School: SET		**Batch : 2018**	
Program: MCA		**Current Academic Year: 2018-19**	
Branch:		**Semester: V**	
1	Course Code	MCA362 | Course Name	
2	Course Title	Web and its application	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-2	
	Course Status	Compulsory	
5	Course Objective	Provide the knowledge to design and develop web application with and without database. Students will gain the skills and project-based experience needed for entry into web application and development careers.	
6	Course Outcomes	On successful completion of this module students will be able to: 1. Design interactive web pages by applying CSS 2. Design web page which has animation and dynamic data 3. Design web pages/site having validation on user data access. 4. Develop web site for small business and organization or for individual	
7	Course Description	This course is an overview of the modern Web technologies used for the Web development. The purpose of this course is to give students the basic understanding of how things work in the Web world from the technology point of view as well as to give the basic overview of the different technologies.	
8	Outline syllabus		CO Mapping
	Unit 1	**HTML& HTML 5**	
	A	**HTML& HTML 5:** HTML basic tags, various links implementation, image map, table formatting, form design.	CO3,CO4
	B	Page layout design using frame, div and span tag, iframe, embed file/object with web pages, DHTML	CO2, CO3,CO4
	C	HTML5: New elements, canvas, offline webpage, HTML Media: video, audio, HTML API: geolocation, location storage	CO3,CO4

	Unit 2	**CSS & CSS3**	
	A	**CSS & CSS3:** Introduction, syntax, selector, text formatting, margin, align, Positioning, background formatting	CO1, CO4
	B	Navigation bar, and image gallery	CO1, CO4
	C	CSS3: Introduction, colors, text formatting, fonts formatting, Background formatting, 2D transform, animation	CO1,CO2,CO4
	Unit 3	**Java Script**	
	A	**Java Script:** Introduction, syntax, comment, statement, variable, operators, Conditional statements, looping statements	CO3,CO4
	B	Functions, object, events, Accessing form elements, validating form elements,	CO1,CO2, CO3,CO4
	C	Animation & special effects using JavaScript: rollover effects, image slider, auto content update	CO1, CO2, CO3,CO4
	Unit 4	**Jquery& AJAX**	
	A	**Jquery& AJAX:** Introduction, syntax, selector, events,Jquery effect: hide/show, fade, slide, animate and stop	CO1,CO3,CO4
	B	Jquery HTML: get, set, add, remove, css	CO1,CO3,CO4
	C	AJAX: Introduction, request, response, event	CO1,CO3,CO3
	Unit 5	**PHP**	
	A	**PHP:**Introduction, open source tools for PHP application development, syntax, variables, operators	CO1,CO2,CO3
	B	Conditional statement, iterative statements, array, function, handling form data, sending mail, Upload file, session management, error and exception handling	CO1,CO2,CO3
	C	Filters, PHP-ODBC connectivity	CO1,CO2,CO3
	Mode of examination	Theory	
	Weightage Distribution	CA / MTE / ETE	
		30% / 20% / 50%	
	Text book/s*	1. Ivan Bayross,"HTML,DHTML, JavaScript, Perl & CGI", BPB Publication 2. Steven Holzner,"PHP: The Complete Reference", TataMcGraw Hill Publication	
	Other References	1. Rick Delorme," Programming in HTML5 with JavaScript and CSS3", Microsoft 2. Burdman, "Collaborative Web Development" Addison Wesley. 3. Chris Bates, "Web Programing Building Internet Applications", Latest Edition, WILEY.	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1:Design interactive web pages by applying CSS .	PO3,PO5,PO8,PO12,PS01,PSO3,PSO4
1.	CO2: Design web page which has animation and dynamic data	PO3,PO5,PO8,PO10,PSO3,PSO4

2.	CO3: Design web pages/site having validation on user data access. .	PO3,PO4,PO5,PO8,PO10, PS01,PSO3,PSO4
3.	CO4: Develop web site for small business and organization or for individual	PO3,PO4,PO5,PO8,PO10, PO12,PSO3,PSO4

PO and PSO mapping with level of strength for Course Name Data Warehouse and Data Mining (Course Code MCA 362)

Cos	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	PSO2	PSO3	PSO4
CO1	1	-	3	1	3	2	-	3	2	2	2	3	3	-	3	3
CO2	2	-	3	2	3	2	-	3	1	3	2	3	2	-	3	3
CO3	1	-	3	3	3	2	-	3	1	3	2	3	3	-	3	3
CO4	2	-	3	3	3	2	-	3	2	3	2	3	2	-	3	3

School: SET		**Batch: 2018-2021**
Program: MCA		**Current Academic Year: 2018-19**
Branch:		**Semester: 5**
1	Course Code	MCP361
2	Course Title	Python Programming Concepts Lab
3	Credits	3-0-2
4	Contact Hours (L-T-P)	4
	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**	
		Program to make connections with different databases **Program to access database**	CO6,CO4,CO2
	Mode of examination	Practical and Viva	
	Weightage Distribution	CA / MTE / ETE	
		60% / 0% / 40%	
	Text book/s*	16. The Complete Reference Python, Martin C. Brown, McGrwHill	
	Other References	21. Introduction to computing in problem solving using Python, E Balahurusamy, McGrwHill 22. Introduction to programming using Python, Y. Daniel Liang, Pearson 23. Mastering Python, Rick Van Hatten, Packet Publishing House 24. Starting out with Python, Tony Gaddis, Pearson	

School:		**Batch:**	
Program: BTECH		**Current Academic Year:**	
Branch:		**Semester:**	
1	Course Code	**MCP 362**	
2	Course Title	Web Technology	
3	Credits	4	
4	Contact Hours (L-T-P)	3-0-2	
	Course Status	Provide the knowledge to design and develop web application with and without database. Students will gain the skills and project-based experience needed for entry into web application and development careers. It provides information about web technologies that relate to the interface between web servers and their clients.	
5	Course Objective	On successful completion of this module students will be able to: 5. Design interactive web pages 6. Design web pages/site having validation on user data access. 7. Develop web site for small business and organization or for individual 8. Client server communication RMI	
6	Course Outcomes	This course is an overview of the modern Web technologies used for the Web development. The purpose of this course is to give students the basic understanding of how different computers and devices to communicate and share resources as well as to give the basic overview of the different technologies.	
7	Course Description	This course is an overview of the modern Web technologies used for the Web development. The topics include (although in some cases briefly): History of the Web, Hypertext Markup Language (HTML), Extensible HTML (XHTML), Cascading Style Sheets (CSS), and JavaScript.	
8	Outline syllabus		CO Mapping
	Unit 1	**INTRODUCTION TO HTML & JAVA SCRIPT**	
		1. Write HTML code to design College Website 2. **Write HTML code to design students registration form** **3. Write javascript code to perform validation on above form.**	CO1, CO2
	Unit 2	**XML**	
		1. Write a program in XML to create Product Catalog. 2. Write a program for Product Catalog DTD. 3. Write a program to display the XML file data into HTML file.	CO1,CO2
	Unit 3	**JAVA APPLET & SERVLET**	
		1. Write a program to count number of character in words in the text written in text area.	CO2, CO3,CO4

		2. Write a program to draw circle using mouse click event. 3. Write a program to insert and then retrieve name,rollno,and branch rom the database using JDBC	
	Unit 4	**JAVA SERVER PAGES & ENTERPRISE JAVA BEANS**	
		1. Write a program to create registration form using jsp. 2. Write a program to describe jsp:param,jsp:include and jsp forward action. 3. Write a program to implement EJB	CO1,CO2,CO3
	Unit 5	**RMI AND JAVA NETWORKING**	
		1. Write a program to perform addition using RMI 2. Create Chat application using TCP socket Programming. 3. Write a program in which Client keeps reading input from user and sends to the server until "Over" is typed.	CO3,CO4
	Mode of examination	Jury/Practical/Viva	
	Weightage Distribution	CA: 60% / MTE: 0% / ETE: 40%	
	Text book/s*	3. Ivan Bayross,"HTML,DHTML, JavaScript, Perl & CGI", BPB Publication 4. Schildt H, "The Complete Reference JAVA2", TMH 5. Schildt H, "The Complete Reference J2EE", TMH	
	Other References	4. Rick Delorme," Programming in HTML5 with JavaScript and CSS3", Microsoft	

School:		**Batch : 2018**	
Program: MCA		**Current Academic Year:**	
Branch:		**Semester: 5**	
1	Course Code	MCA363 Course Name:	
2	Course Title	**Business Intelligence**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Elective	
5	Course Objective	1 .Provide students with an overview of the methodologies and approaches to Business Intelligence 2.It focuses on dashboards design by utilizing key performance indicators that managers can use to improve day-to-day business operations 3.Provide students to plan and implement BI development projects 4. Prepare student to know the administrative and deployment scenarios & issues in BI space.	
6	Course Outcomes	Students will be able to: **CO1:**Design and develop dashboards **CO2:**Learn the best practices to work on BI projects. **CO3:**Use tools to develop, implement and administrate wide range of BI artifacts **CO4:**Apply various modeling techniques and Apply business intelligence methods to various situations	
7	Course Description	This course have an overall understanding of the major issues and applications in business intelligence including a basic grasp of the algorithm classes and best practices for building successful BI projects.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Business Intelligence:**	
	A	Business Intelligence (BI), Scope of BI solutions and their fitting into existing infrastructure, BI Components and architecture, BI Components, Future of Business Intelligence, SaaS and Cloud computing techniques	CO2,CO3
	B	Functional areas of BI tools, End user assumptions, Setting up data for BI, Data warehouse, OLAP and advanced analytics,	CO2,CO3
	C	Supporting the requirements of senior executives including performance management, Glossary of terms and their definitions specific to the field of BI and BI systems.	CO2,CO3
	Unit 2	**Elements of Business Intelligence Solutions:**	
	A	Business Query and Reporting, Dashboard design principles, Dashboards and Scorecards Development,	CO1,CO2

	B	Role of Metadata, challenges of Metadata ,Automated Tasks and Events			CO1,CO2
	C	Mobile Business Intelligence, Software development kit (SDK).			CO1,CO2
	Unit 3	**Building BI Project:**			
	A	Stages of Business Intelligence Projects, Gartner Maturity Model, ASUG business intelligence maturity model			CO3,CO4
	B	Risk Management and Mitigation, Cost justifying BI solutions			CO3,CO4
	C	measuring success. BI Design and Development.			CO3,CO4
	Unit 4	**Reporting** :			
	A	Metadata Layer, Presentation Layer, Data Layer, Use of different layers and overall Reporting architecture,			CO2,CO3
	B	Basic Report authoring, Various report elements such as Charts, Tables, prompts, Data aggregation			CO2,CO3
	C	Table based, Materialized views, OLAP, Ad-hoc reports, interactivity in analysis (drill down, drill up).			CO2,CO3
	Unit 5	**BI Deployment and Efficiency:**			
	A	Centralized versus Decentralized Architecture, EPM (Enterprise performance Management).			CO4,CO2
	B	**E**fficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis			CO4,CO2
	C	virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis.			CO4,CO2
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	1.Jerzy Surma,2011, *Business Intelligence: Making Decisions through Data Analytics*, New York, N.Y., Business Expert Press			
	Other References	1. Carlo Vercellis,*Business Intelligence: Data Mining and Optimizationfor Decision Making*, A John Wiley and Sons, Ltd., Publication 2. Ralph Kimball, Margy Ross, *"The complete Guide to dimensional modeling* Latest edition, Publisher: Wiley publication ISBN- 0-471-20024-7 3. Ralph Kimball, Joe Caserta," *"The data warehouse ETL toolkit: practical techniques for extracting, cleaning, conforming, and delivering data""*, Publisher: Wiley. ISBN: 0-7645-6757-8			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:**Design and develop dashboards	PO1,PO3,PO4,PO5,PO9,PO11,PO12

2.	**CO2:**Learn the best practices to work on BI projects.	PO1, PO3, PO4,PO9,PO12
3.	**CO3:**Use tools to develop, implement and administrate wide range of BI artifacts	PO1,PO2,PO3,PO4,PO5,PO9,PO11,PO12
4.	**CO4:**Apply various modeling techniques and Apply business intelligence methods to various situations	PO1, PO2,PO3, PO5,PO9,PO10,PO11,PO12

PO and PSO mapping with level of strength for Course Name Business Intelligence(Course Code MCA363)

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

School: SET		**Batch : 2018**
Program: MCA		**Current Academic Year: 2018-19**
Branch:		**Semester: V**
1	Course Code	MCA364 | Course Name:
2	Course Title	Cryptography & Network Security
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Elective
5	Course Objective	To familiarize the students with security related issues in computer and communication networks which are the basic building blocks of all IT infrastructures based organizations and the role of cryptography in mitigating these security threats.
6	Course Outcomes	After the successful completion of this course, students will be able to : CO1: Understanding of threat perception in the computer and communication network and able to recognize the vulnerability in the various layers of the network. CO2: Analyze the conventional ciphers and steganographic technique which are basically designed to maintain confidentiality of the data. CO3: Establish the mathematical background for development of symmetric and asymmetric key cryptography. CO4: Developing skills for implementation of cryptographic tools. CO5: Comprehend the working knowledge of the security protocols during data

		communication.			
7	Course Description	This course introduces the concepts of cryptography and mathematical skills needed for implementation of security tools for confidentiality, integrity, authentication and authorization in the computer and communication networks			
8	Outline syllabus				CO Mapping
	Unit 1	**Introduction**			
	A	OSI Security architecture, Security Attack, Security Services, Security Mechanism and model for network security.			CO1,CO2
	B	**Pre-requisite Mathematics:** Number Theory, Integer Arithmetic, Modular Arithmetic, Extended Euclid Algorithm, and Congruence's, Eulers Totient Function , Fermat little Theorem,			CO2,CO3
	C	Symmetric key cryptosystems. Substitution ciphers, Additive and Multiplicative ciphers, mono-alphabetic and poly alphabetic ciphers. Transposition ciphers, Mechanical and electromechanical systems.			CO2,CO3,CO4
	Unit 2	**Modern Cryptography**			
	A	One Time Pad, the Concept of modern cryptography, Random numbers, Basic tests of randomness.			CO3
	B	Classification of Symmetric Cipher systems, Modes of operation.			CO3,CO4
	C	Stream ciphers, RC4, and Block ciphers. DES and AES.			CO3,CO4
	Unit 3	**Asymmetric Cryptography & Key Exchange**			
	A	**Pre-requisite Mathematics:** Random number generator, LCG, Prime Number and Primality Testing- Miller Rabin test,, factorization, Exponentiation- square and multiply method, Discrete logarithms, Chinese Remainder Theorem			CO2,CO3
	B	Public Key cryptography-RSA, Cryptanalysis of RSA, Elgamal cryptography,			CO2,CO3
	C	Management of Keys, Key Distribution Center, Life time of the keys, Symmetric Key length, Asymmetric key length, Diffie Hellman key exchange			CO3,CO4
	Unit 4	**Digital Signatures**			
	A	Digital Signature Algorithms (DSA), DSA- variants User Authentication protocol- Kerberos, Digital Signature –RSA, Elgamal			CO2,CO3
	B	Iterated Hash function, characteristics of Hash Functions,			CO2,CO4
	C	Data integrity algorithms, MD5, SHA-512			CO2,CO4
	Unit 5	**Security**			
	A	Security at Application layer-Email Architecture, S/MIME, PGP(Scenarios, key rings, PGP Certificates)			CO4,CO5
	B	Security at Transport layer-SSL(Services, Protocols)			CO4,CO5
	C	Security at Network layer-IPSec(Modes, Protocols, Security Association), Internet Key exchange			CO4,CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	10. Stallings, W., "Cryptography and Network Security – Principles and Practices", Prentice Hall of India, Fourth Edition.			
	Other	1. Behrouz A. Forouzan, "Cryptography And Network Security"- McGraw Hill			

	References	2. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.Internet as a resource for reference	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	CO1: Analyze the conventional ciphers and stenographic technique which are basically designed to maintain confidentiality.	PO1,PO2,PO11,PSO1
2.	CO2: Compare the algorithms developed in modern cryptographic era. (ABET program outcomes a and j)	PO1,PO2,PO3,PSO1,PSO2
3.	CO3: Establish the mathematical background of the ciphers proposed in symmetric and asymmetric key cryptography.	PO1,PO2,PSO1,PSO2
4.	CO4: Comprehend the working knowledge of security protocols during data communication.	PO1,PO2,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name Cryptography & Network security(Course Code MCA 364)

CSE	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
	CO 1	3	3	1	1	1	1	1	1	1	2	3	2	3	3	1	1	1
	CO 2	3	3	3	1	1	2	2	2	2	1	1	1	3	3	1	2	2
	CO 3	3	3	2	2	2	1	2	2	2	1	1	1	3	3	1	2	1
	CO 4	3	3	2	2	1	1	1	2	2	1	1	2	3	3	1	2	2

School: SET		**Batch : 2018**
Program: MCA		**Current Academic Year: 2018-19**
Branch:		**Semester: V**
1	Course Code	MCA365
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	22. Introduces students with an overview and concepts of software

		project management. 23. Gain insight into the challenges and limitations of different phases of software project management 24. Using techniques for planning, monitoring and control of software projects 25. Prepare students understand project evaluation and software effort estimation. 26. 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 specification, information and control in organization.	CO1, CO2
	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	CO1,CO2,CO3

		analysis, cash flow forecasting,	
	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	PO1,PO2,PO3,PO4

	completion of a project.	
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 Manageent (Course Code MCA 365)

Cos	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	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

School: SET		**Batch : 2018**
Program: MCA		**Current Academic Year: 2918-19**
Branch:		**Semester: V**
1	Course Code	MCA366 | Course Name
2	Course Title	**Essentials of Big data Analytics**
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Elective
5	Course Objective	Understand the Big Data Platform and its Use cases • Provide an overview of Apache Hadoop • Provide HDFS Concepts and Interfacing with HDFS • Understand Map Reduce Jobs • Provide hands on Hodoop Eco System • Apply analytics on Structured, Unstructured Data. • Exposure to Data Analytics with
6	Course Outcomes	The students will be able to: • Identify Big Data and its Business Implications. • List the components of Hadoop and Hadoop Eco-System • Access and Process Data on Distributed File System • Manage Job Execution in Hadoop Environment • Develop Big Data Solutions using Hadoop Eco System
7	Course	

	Description				
8	Outline syllabus				CO Mapping
	Unit 1	**INTRODUCTION TO BIG DATA AND HADOOP**			
	A	Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop			CO1, CO2
	B	Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming,			CO1, CO2
	C	Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.			CO1, CO2
	Unit 2	**HDFS(Hadoop Distributed File System)**			
	A	The Design of HDFS, HDFS Concepts, Command Line Interface			CO1, CO2,CO4
	B	Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives,			CO1, CO2,CO4
	C	Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures..			CO1, CO2,CO4
	Unit 3	**Map Reduce**			
	A	Anatomy of a Map Reduce Job Run, Failures, Job Scheduling			CO1,CO2,CO3
	B	Shuffle and Sort, Task Execution,			CO1,CO2,CO3
	C	Map Reduce Types and Formats, Map Reduce Features.			CO4
	Unit 4	**Hadoop Eco System**			
	A	**Pig** : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.			CO1,CO2,CO3
	B	**Hive**: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.			CO1,CO2,CO3
	C	**Hbase :** HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction			CO1,CO2,CO3
	Unit 5	**Data Analytics with R:**			
	A	Introduction, Supervised Learning, Unsupervised Learning,			CO1,CO2,CO3
	B	Collaborative Filtering			CO1,CO2,CO3
	C	Big Data Analytics with BigR.			CO1,CO2,CO3
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	17. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012. 18. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015			
	Other References	25. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007. 26. Jay Liebowitz, "Big Data and Business			

		Analytics" Auerbach Publications, CRC press (2013) 27. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press. 28. Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1** Identify Big Data and its Business Implications.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:** List the components of Hadoop and Hadoop Eco-System	PO1, PO3, PO4, PSO2
3.	**CO3:** Access and Process Data on Distributed File System	PO2,PO3,PO4,PSO3
4.	**CO4:** Manage Job Execution in Hadoop Environment	PO7, PO10,PO11, PSO5
5	**CO5:** Develop Big Data Solutions using Hadoop Eco System	PO4,PO8

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

	COs	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	PSO2	PSO3	PSO4	PSO5
	CO1	3	3	3	3	--	--	--	2	2	1	2	1	3	2	2	1	2
	CO2	3	2	3	3	--	--	--	2	2	2	1	1	2	3	2	1	2
	CO3	3	3	3	3	--	--	--	1	1	1	3	2	3	2	1	1	1
	CO4	2	2	2	2	1	--	--	2	3	3	3	1	2	2	2	1	3
	CO5	3	2	3	3	1	-	1	3	2	2	2	2	2	2	2	1	1

1

School: SET		**Batch :2018**	
Program: MCA		**Current Academic Year: 2018-19**	
Branch:		**Semester: V**	
1	Course Code	MCA367 | Course Name: MCA	
2	Course Title	**Cyber Law**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Elective	
5	Course Objective	• Enable learner to understand, explore, and acquire a critical understanding Cyber Law. • Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cyber crimes for example, child pornography etc. that are taking place via the Internet; • Make learner conversant with the social and intellectual property issues emerging from 'Cyberspace; • Explore the legal and policy developments in various countries to regulate Cyberspace; • Develop the understanding of relationship between commerce and cyberspace; and • Give learners in depth knowledge of Information Technology Act and legal frame work of Right to Privacy, Data Security and Data Protection	
6	Course Outcomes	Students will be able to: **CO1:** Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cyber crimes for example, child pornography etc. that are taking place via the Internet **CO2:** Explore the legal and policy developments in various countries to regulate Cyberspace	
7	Course Description	This course introduces aspects of cyber security, encompassing the principles, to analyze the data, identify the problems, and choose the relevant countermeasures to apply.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Cyber Security**	
		Understanding Computers, Internet and Cyber Laws, intellectual property, defamation, privacy concerns, censorship, cyber fraud, e – commerce law, information security legal liabilities, insurance law, the clash of laws, cyber law dispute resolution, the law of linking, cyber crime	CO1, CO2
	Unit 2	Protection of Intellectual Property Rights in CyberSpace in India, Compensation and Adjudication of Violations of Provisions of It Act and Judicial Review, Some important Offeneces under the	CO1,CO2

		CyberSpace Law and the Internet in India, Other Offences under the Information Technology Act in India			
	Unit 3	**Role of Evidences and Rules**			
		The Role of Electronic Evidence and the Miscellaneous Provisions of the IT Act, Legal Aspects of Electronic Records/Digital Signatures, The Rules and Regulations of Certifying Authorities in India			CO1,CO2
	Unit 4	**Cyber Space Laws**			
		International Efforts Related to CyberSpace Laws, Fundamental Jurisdiction Principles Under International Law, Classic U.S. Jurisdiction Principles, Council of Europe convention on cyber crimes			CO1,CO2
	Unit 5	**Tools**			
		Tools: Cyber Check, TrueBack, Hasher, EmailTracer, Pasco, Nmap, BinText			CO1,CO2
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		30%	20%	50%	
	Text book/s*	19. Cyber Law and IT Protection, Chander Harish 20. Handbook of Information Security, HosseinBidgol			

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:**Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cyber crimes for example, child pornography etc. that are taking place via the Internet	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:**Explore the legal and policy developments in various countries to regulate Cyberspace	PO1, PO3, PO4, PSO2

PO and PSO mapping with level of strength for Course Name Cyber Law (Course Code MCA 367)

	Cos	PO1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO8	PO9	PO10	PO 11	PO12	PS O1	PSO2	PSO3	PSO4	PSO5
	CO1	2	3	1	1	1	1	2	2	1	1	1	1	2	1	2	2	1
	CO2	3	1	1	2	--	--	3	3	2	3	1	1	2	2	2	2	1
	CO3	3	1	3	3	--	1	1	1	1	2	2	1	1	2	1	2	2
	CO4	2	2	2	2	2	--	--	1	2	1	3	1	1	3	1	2	2

School: SET		**Batch : 2018**	
Program: MCA		**Current Academic Year: 2018-19**	
Branch:		**Semester: V**	
1	Course Code	MCA368 | Course Name: MCA	
2	Course Title	Software Testing	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Elective	
5	Course Objective	4. This course provides an introduction to the fundamentals of distributed computer systems, 5. Designing Algorithms used in Distributed system. 6. 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	Overview of software evolution, SDLC, Testing Process, Terminologies in Testing: Error, Fault, Failure,	CO1, CO2
	B	Verification, Validation, Difference between Verification	CO1, CO2

		and Validation, Test Cases,	
	C	Testing Suite, Test Oracles, Impracticality of Testing All data; Impracticality of testing AllPaths.	CO1, CO3
	Unit 2	**Test Analysis:**	
	A	Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing,	CO1, CO2,CO4
	B	Cause Effect Graphing Technique. Structural Testing: Control flow testing,	CO1, CO2,CO4
	C	Path testing, Independent paths, Generation of graph from program, Identification of independent paths.	CO1, CO2,CO4
	Unit 3	**Regression Testing:**	
	A	Regression Test cases selection, Reducing the number of test cases,.	CO1,CO2,CO3
	B	Code coverage prioritization technique	CO1,CO2,CO3
	C	Reducing the number of test cases: Prioritization guidelines, Priority category, Scheme, Risk Analysis.	CO4
	Unit 4	**Documentation**	
	A	Software Testing Activities: Levels of Testing, Debugging, Testing techniques and theirApplicability,	CO1,CO2,CO3
	B	Exploratory Testing Automated Test Data Generation: Test Data, Approaches to test data generation,	CO1,CO2,CO3
	C	test data generation using genetic algorithm, Test Data Generation Tools, Software Testing Tools, and Software test Plan.	CO1,CO2,CO3
	Unit 5	**Object Oriented Testing:**	
	A	Object oriented Testing: Definition, Issues, Class Testing, Object Oriented Integration and System Testing.	CO1,CO2,CO3
	B	Testing Web Applications: What is Web testing?, User interface Testing,	CO1,CO2,CO3
	C	Usability Testing, Security Testing, Performance Testing.	CO1,CO2,CO3
	Mode of examination	Theory	
	Weightage Distribution	CA / MTE / ETE 30% / 20% / 50%	
	Text book/s*	Yogesh Singh, “Software Testing”, Cambridge University Press, New York, 2012	
	Other References	5. Naresh Chauhan, “Software Testing : Principles and practices”, Oxford university press, Latest Edition 6. K..K. Aggarwal&Yogesh Singh, “Software Engineering”, New Age International Publishers, New Delhi, 2003. 7. Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, Fifth Edition, McGraw-Hill International Edition, New Delhi,2001. 8. Marc Roper, “Software Testing”, McGraw-Hill Book Co., London, 1994. 9. Boris Beizer, “Software System Testing and Quality	

		Assurance", Van NostrandReinhold, New York, 1984.	

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1.	**CO1:** apply software testing knowledge and engineering methods.	PO1,PO2,PO3,PO4,PSO1
2.	**CO2:**design and conduct a software test process for a software testing project.	PO1, PO3, PO4, PSO2
3.	**CO3:**identify the needs of software test automation, and define and develop a test tool to support test automation.	PO1,PO2,PO3,PO4
4.	**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.	PO9, PO10,PO11, PSO5

PO and PSO mapping with level of strength for Course Name Software Testing (Course MCA 368)

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