

# MASTER OF COMPUTER APPLICATIONS

**CURRICULUM FRAMEWORK AND SYLLABUS  
FOR OUTCOME BASED EDUCATION  
(For the students joining in the  
Academic Year 2018 - 2019 and afterwards)**



**DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS  
THE GANDHIGRAM RURAL INSTITUTE  
(Deemed to be University)  
Gandhigram - 624 302  
Dindigul District  
Tamil Nadu**

**THE GANDHIGRAM RURAL INSTITUTE**  
(Deemed to be University)

**DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS**

**MASTER OF COMPUTER APPLICATIONS**

**Vision**

To provide quality-assured academic, research and extension services in the domain of Computer Science and Applications, to promote dissemination of knowledge in Information and Communication Technologies for Rural Development.

**Mission**

Empower the rural youth by transforming them into proficient and socially responsible computer professionals and cater them to the envisaged demand in the operational and functional domains of the industries and service sectors.

**Graduate Attribute**

The graduates of our institute are expected to possess the following attributes.

1. *Informed*  
The graduates of GRI are well-informed and are able to retrieve, analyse and assimilate complex information. They understand the local and global issues and are able to apply their knowledge. They are able to work in tandem with the rural community.
2. *Problem solver*  
The graduates of GRI have the ability to work on development issues. They are capable of being creative, logical and critical thinking which in turn help them to respond to challenges and opportunities effectively. They are also capable of making and implementing decisions.
3. *Active learners and critical thinkers*  
Graduates of this university are active learners and are capable of critically analyzing issues. They are capable of undertaking critical enquiry and reflection, find and evaluate information using a variety of sources and technologies. They do possess the attitude of acknowledging the works and ideas of others.
4. *Effective communication*  
The graduates have good communication skills and are capable of articulating their ideas effectively. They can negotiate and engage with people in varied settings.
5. *Rural Minded*  
The graduates of GRI are well-informed and are able to retrieve, analyse and assimilate complex information. They understand the local and global issues and are able to apply their knowledge. They are able to work in tandem with the rural community.

The Gandhigram Rural Institute  
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DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

**OBE Elements for Master of Computer Applications Programme**

**PROGRAMME EDUCATIONAL OBJECTIVES (PEO)**

- PEO 1: To prepare the graduates with strong technical competence to progress in their career as a computing professional.
- PEO2: To create an academic environment to gain strong knowledge in technical and programming fundamentals to pursue higher studies.
- PEO 3: To enable the students to become entrepreneurs in Information Technology (IT) enabled ventures.
- PEO 4: To prepare the students to continue the process of lifelong learning through professional activities that contribute to personal and social development.
- PEO 5: To train the students to apply current tools and technologies to develop software solutions for social needs.
- PEO 6: To imbibe strong human, professional and ethical values to become a socially responsible citizen.

**PROGRAMME OUTCOME (PO)**

- PO 1: Become proficient in the subject of Computer Science and apply the principles of the same to the needs of the Employer/Institution/ Enterprise/ Society.
- PO 2: Gain Analytical skills in the field/area of Computer Science and Applications.
- PO 3: Apply modern Hardware and Software tools in the development of innovative software solutions.
- PO 4: Practice professional ethics, community living and Nation Building initiatives.
- PO 5: Disseminate the knowledge in Information and Communication Technologies for Rural Development.
- PO 6: Develop skills to communicate effectively among the IT community.
- PO 7: Kindle interests to critically review, analyse and develop solutions through active research.
- PO 8: Execute the imbibed skills to become a successful entrepreneur.

### PROGRAMME SPECIFIC OUTCOME (PSO)

- PSO 1: Apply the knowledge of Computer Science in the domain of Academic/ Industry/ Institutions/ Society.
- PSO 2: Solve the complex problems in the field of Computer Science with an understanding of the societal, legal, cultural impacts of the solution.
- PSO 3: Lay foundation to apply the knowledge to become active researcher in the field of the Computer Science.
- PSO 4: Create solutions for integrated rural development through Information and Communication Technologies.
- PSO 5: Empower with self-sustainable rewarding career opportunities in IT and IT enabled service sectors.

### Mapping of PEOs with PSOs & POs:

PEO/PO/ PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
PEO1	3	3	3	1	3	2	3	2	3	3	3	3	3
PEO2	3	3	3	1	3	1	3	-	3	3	3	2	1
PEO3	3	3	3	2	2	3	3	3	3	3	-	3	2
PEO4	3	3	3	2	3	2	3	1	3	3	3	2	2
PEO5	3	3	3	2	3	2	3	2	3	3	3	3	3
PEO6	-	-	-	3	1	1	-	2	-	1	-	-	3

- Strongly Correlating (S) - 3 marks
- Moderately Correlating (M) - 2 marks
- Weakly Correlating (W) - 1 mark
- No Correlation (N) - 0 mark

### CO & PO Attainment Rubrics

#### **Direct Assessment:**

- i) CFA & ESE - 30 %
- ii) Assignment/Reports/Case Study - 40%

#### **Indirect Assessment:**

- i) Exit Survey - 30 %

**THE GANDHIGRAM RURAL INSTITUTE (Deemed to be University)**  
**DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS**  
**MASTER OF COMPUTER APPLICATIONS**  
 (Under Choice Based Credit System)  
**SUBJECTS OF STUDY AND SCHEME OF EXAMINATION**  
 (For the students joining in the Academic Year 2018– 2019 and afterwards)

Code No.	Subject	Credits	Lecture Hrs/ Week	Lab Hrs/ Week	Evaluation		Total
					CFA	ESE	
<b>SEMESTER – I</b>							
18MCAP0101	Programming in C	4	4	-	40	60	100
18MCAP0102	Computer Organisation	4	4	-	40	60	100
18MCAP0103	Design and Analysis of Algorithms	4	4	-	40	60	100
18MCAP0104	Mathematical Foundation of Computer Science	4	4	-	40	60	100
18COPP01A1	Accounting and Financial Statement Analysis	4	4	-	40	60	100
18MCAP0105	Lab – I : C Programming & Algorithms	1	-	3	60	40	100
18MCAP0106	Lab – II: Multimedia	1	-	3	60	40	100
18GTTP0001	Gandhi in Everyday Life	-	2	-	50	-	50
<b>Total Credits</b>		<b>22</b>					
<b>SEMESTER – II</b>							
18MCAP0207	Object Oriented Programming in C++	4	4	-	40	60	100
18MCAP0208	Operating Systems	4	4	-	40	60	100
18MCAP0209	Data and File Structures	4	4	-	40	60	100
18MCAP0210	Microprocessors and Applications	4	4	-	40	60	100
18MATP02A1	Numerical and Statistical Methods	4	4	-	40	60	100
18MCAP0211	Lab – III : C++ Programming & DFS	1	-	3	60	40	100
18MCAP0212	Lab – IV : Shell Programming & ALP	1	-	3	60	40	100
18ENGP00C1	Communication and Soft Skills	-	2	-	50	-	50
<b>Total Credits</b>		<b>22</b>					
<b>SEMESTER – III</b>							
18MCAP0313	Java Programming	4	4	-	40	60	100
18MCAP0314	Principles of Compiler Design	4	4	-	40	60	100
18MCAP0315	Database Management Systems	4	4	-	40	60	100
18MCAP03EX	Major Elective – I	4	4	-	40	60	100
18MCAP03MX	Modular Course – I	2	2	-	50	-	50
18MCAP0316	Lab – V : GUI & RDBMS	1	-	3	60	40	100
18MCAP0317	Lab – VI: Java Programming	1	-	3	60	40	100
18MCAP03F1	Extension / Field Visit	-	-	2	50	-	50
18EXNP03V1	Village Placement Programme	2	-	-	50	-	50
<b>Total Credits</b>		<b>22</b>					

Code No.	Subject	Credits	Lecture Hrs/Week	Lab Hrs/Week	Evaluation		Total
					CFA	ESE	
<b>SEMESTER – IV</b>							
18MCAP0418	Web Programming	4	4	-	40	60	100
18MCAP0419	Computer Networks	4	4	-	40	60	100
18MCAP04EX	Major Elective – II	4	4	-	40	60	100
18MCAP04EY	Major Elective – III	4	4	-	40	60	100
18MCAP04MX	Modular Course – II	2	2	-	50	-	50
18MCAP0420	Lab – VII : Web Programming	1	-	3	60	40	100
18MCAP0421	Lab – VIII: Networks	1	-	3	60	40	100
18MCAP0422	Mini Project on IT for Rural Development	2	-	-	50	-	50
<b>Total Credits</b>		<b>22</b>					
<b>SEMESTER – V</b>							
18MCAP0523	Python Programming	4	4	-	40	60	100
18MCAP0524	Software Engineering	4	4	-	40	60	100
18MCAP05EX	Major Elective – IV	4	4	-	40	60	100
18MCAP05EY	Major Elective – V	4	4	-	40	60	100
18MCAP05EZ	Major Elective – VI	4	4	-	40	60	100
18MCAP0525	Lab – IX: Python Programming	1	-	3	60	40	100
18MCAP0526	Lab – X : .Net Programming	1	-	3	60	40	100
18MCAP0527	Mini Project (Mobile Applications Development)	2	-	-	50	-	50
<b>Total Credits</b>		<b>24</b>					
<b>SEMESTER – VI</b>							
18MCAP0628	Dissertation **	<b>14</b>	-	-	75	75+50	<b>200</b>
<b>Total Credits for MCA Programme</b>		<b>126</b>					

CFA – Continuous Formative Assessment (Internal Evaluation)

ESE – End Semester Examination (External Evaluation)

\*\* Evaluated for 200 marks as below:

75 marks for the valuation of the Dissertation by the Internal Examiner

75 marks for the valuation of the Dissertation by the External Examiner

50 marks for the Viva-Voce jointly by the Internal and External Examiners

### List of Electives

#### **Major Elective –I (18MCAP03EX)**

- 18MCAP03E1 Optimization Techniques
- 18MCAP03E2 Graph Theory\*
- 18MCAP03E3 Linear Programming\*

#### **Major Elective –II (18MCAP04EX)**

- 18MCAP04E1 Image Processing
- 18MCAP04E2 Bio Informatics\*
- 18MCAP04E3 Software Testing#

#### **Major Elective –III (18MCAP04EY)**

- 18MCAP04E4 Computer Graphics
- 18MCAP04E5 Service Oriented Architecture\*
- 18MCAP04E6 Project Management for Managers#

#### **Major Elective –IV (18MCAP05EX)**

- 18MCAP05E1 Information Security
- 18MCAP05E2 Mobile Communications
- 18MCAP05E3 Introduction to Wireless and Cellular Communications#

#### **Major Elective –V (18MCAP05EY)**

- 18MCAP05E4 Organizational Behaviour
- 18MCAP05E5 Big Data Analytics\*
- 18MCAP05E6 Introduction to Internet of Things\$

#### **Major Elective –VI (18MCAP05EZ)**

- 18MCAP05E7 Data Mining
- 18MCAP05E8 Artificial Intelligence and Deep Learning
- 18MCAP05E9 Introduction to Machine Learning\$

### List of Modular Courses

#### **Modular Course – I (18MCAP03MX)**

- 18MCAP03M1 Advanced Computing Techniques for Rural Applications
- 18MCAP03M2 Computer Animation
- 18MCAP03M3 Computer Hardware and Troubleshooting\*

#### **Modular Course – II (18MCAP04MX)**

- 18MCAP04M1 Cyber Security and IT Act
- 18MCAP04M2 Network Administration\*
- 18MCAP04M3 Accounting Software\*

\* Syllabus under preparation

# SWAYAM Course

\$ NPTEL Course

# SEMESTER I

<b>Course Code &amp; Title</b>	<b>18MCAP0101 PROGRAMMING IN C</b>		
	<b>Credits: 4</b>		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>I</b>
<b>Cognitive Level</b>	<b>K-2:</b> Understand the basics of C Programming <b>K-3:</b> Apply the knowledge in C for Problem solving <b>K-4:</b> Analyse the scope & suitability of data types and data structures of C while programming		
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Impart the Principles of C Language</li> <li>• Lay the foundation to learn other advanced programming languages</li> <li>• Motivate the students to develop projects using C</li> </ul>		

UNIT	CONTENTS	Lecture Schedule
<b>I</b>	<b>C Language Fundamentals</b>	12
	Program Structure Identifiers – Data Types – Integer – Float – Character – Constants – Variables Operators and Expressions Managing Input and Output Operations.	
<b>II</b>	<b>C Control Structures</b>	12
	Decision making with <i>if</i> Statement – <i>if ... else</i> Statement – Nested <i>if ... else</i> Statements Loop Statement: <i>for</i> Statement – <i>do... while</i> Statement – <i>while ... do</i> Statement – <i>goto</i> Statement – <i>switch</i> Statement	
<b>III</b>	<b>C Functions and its Categories</b>	12
	Mathematical Functions – <i>sin</i> – <i>cos</i> – <i>tan</i> – <i>asin</i> – <i>acos</i> – <i>atan</i> – <i>sqrt</i> – <i>pow</i> – <i>log</i>	
	String Functions – <i>strcpy</i> – <i>strcat</i> – <i>strcmp</i> – <i>strlen</i> – <i>strlwr</i> – <i>strupr</i> User-Defined Functions	
<b>IV</b>	<b>Arrays and Structures</b>	14
	Arrays – Definition – Declaration – Entering Values in Arrays – Manipulating Arrays – Passing an Array Structure and Union: Definition – Assigning Structure Variable – Assigning Initial Values – Using a Structure – Structure Arrays – Structures and Functions-Union	
<b>V</b>	<b>Pointers and File Operations</b>	14
	Understanding Pointers – Pointers and Functions File Operations: Understanding Files – Declaring a File – Opening a File – Closing a File – File Input and Output Functions Formatted Input and Output – Working with Structures – Adding Data to a File – Reading and Printing a Disk File	
<b>Total Conduct Hours</b>		<b>64</b>



**Text Book:**

E. Balagurusamy, Programming in ANSI C, 8/e Tata McGraw Hill, 2019.

**References:**

1. Stephen G. Kochan, Programming in C, 4<sup>th</sup> Ed., Pearson Education, 2015.
2. Byron Gottfried, Programming with C, 2<sup>nd</sup>Ed., TMH publications, 2006.
3. <https://www.tutorialspoint.com/cprogramming/index.htm>
4. <https://www.w3schools.in/c-tutorial/>
5. <http://www.learn-c.org/en/Welcome>

<b>Course Outcomes</b>	<p><b>On successful completion of the course, the students will be able to</b></p> <p><b>CO1:</b> Develop logic for problem solving through programming</p> <p><b>CO2:</b> Decide on the appropriate C data types for problem solving</p> <p><b>CO3:</b> Exhibit ability to contextually and optimally use the C programming constructs - <i>decision making, iteration, looping</i></p> <p><b>CO4:</b> Develop C programs with the concept of modularity using functions</p> <p><b>CO5:</b> Design, code, debug, test and document C programs</p> <p><b>CO6:</b> Provide computational solutions for real-time problems using C Programming</p>
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**Mapping of COs with PSOs:**

CO Vs PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
CO6	3	3	3	3	3

<b>Course Code &amp; Title</b>	<b>18MCAP0102 COMPUTER ORGANIZATION</b> <b>Credits: 4</b>		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>I</b>
<b>Cognitive Level</b>	<b>K-1:</b> Define the basic concepts, Circuit Diagrams and truth tables <b>K-2:</b> Describe the working of various Gates and operations <b>K-3:</b> Apply and analyze the operations performed by circuits		
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Describe the basics of designing a computer system</li> <li>• Explain their working principles using logic circuits.</li> <li>• Evaluate the hardware of a computer, its logic design and organization.</li> <li>• List the various types of Memory and their management</li> <li>• Discuss digital logic and functional design of arithmetic and logic units</li> </ul>		

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Digital Logic Circuits, Components and Data Representation</b>	15
	Digital Logic Circuits: Digital Computers – Logic Gates – Boolean Algebra - Map Simplification – Combinational Circuits - Flip-Flops – Sequential Circuits – Digital Components: Integrated Circuits – Decoders – Multiplexers - Registers – Shift Registers – Binary Counters - Memory Unit -Data Representation: Data Types – Complements – Fixed Point Representation - Floating Point Representation – Error Detection Codes.	
<b>II</b>	<b>Register Transfer and Micro Operations &amp; Basic Computer Organisation and Design</b>	11
	Register Transfer and Micro Operations: Register Transfer Language – Register Transfer – Bus and Memory Transfers - Arithmetic Micro Operations – Logic Micro Operations - Shift Micro Operations – Arithmetic Logic Shift Unit. Basic Computer Organisation and Design: Instruction Codes – Computer Registers – Computer Instructions – Timing and Control - Instruction Cycle – Memory Reference Instructions – Input–Output and Interrupt	
<b>III</b>	<b>Central Processing Unit</b>	13
	Central Processing Unit: General Register Organisation - Stack Organisation - Instruction Formats – Addressing Modes - Data Transfer And Manipulation – Program Control - Reduced Instruction Set Computer (RISC)	
<b>IV</b>	<b>Input–Output Organisation</b>	12
	Input–Output Organisation: Peripheral Devices - Input–Output - Interface - Asynchronous Data Transfer - Modes of Transfer - Priority Interrupts - Direct Memory Access	

IV	<b>Input–Output Organisation</b>	12
	Input–Output Organisation: Peripheral Devices - Input–Output - Interface - Asynchronous Data Transfer - Modes of Transfer - Priority Interrupts - Direct Memory Access	
V	<b>Memory Organisation</b>	13
	Memory Organisation: Memory Hierarchy – Main Memory – Auxiliary Memory - Associative Memory - Cache Memory - Virtual Memory - Memory Management Hardware	
<b>Total Contact Hours</b>		<b>64</b>
<p><b>Text Book:</b> M. Moris Mano, Computer System Architecture, 3/e, Prentice Hall of India, New Delhi, 2003.</p> <p><b>References:</b> 1. J.P.Hayes, Computer Architecture and Organisation, Tata McGraw–Hill, 1993. 2. Hamachar V.C., Vanesic Z.G., Zaky S.G., Computer Organisation, Tata McGraw–Hill, 1978.</p>		
<b>Course Outcomes</b>	<p><b>On successful completion of the course, the students will be able to</b></p> <p><b>CO1:</b> Identify the basic functional units of a computer  <b>CO2:</b> Explain working of a flip flops, registers and counters of computer.  <b>CO3:</b> Define the functional details of CPU and other processors  <b>CO4:</b> Describe the nature of data transfer among peripherals and computer through interface units  <b>CO5:</b> Identify the different forms of memories units and their working Principles</p>	

**Mapping of COs with PSOs:**

CO Vs PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	1	2	2
CO2	3	2	-	2	-
CO3	2	3	3	2	2
CO4	2	2	3	-	2
CO5	2	1	3	-	-

<b>Course Code &amp; Title</b>	<b>18MCAP0103 DESIGN AND ANALYSIS OF ALGORITHMS</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>I</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Describe the fundamental strategies of algorithm design <b>K-2:</b> Apply the appropriate algorithm strategy for finding efficient solution to a given problem <b>K-3:</b> Analyse and compare the performance of different algorithms			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>Describe the basic algorithm design strategies.</li> <li>Demonstrate the performance analysis and comparison of different algorithms.</li> <li>Prepare the students to write effective algorithms for solving a given problem</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	Introduction: What is an Algorithm? Algorithm Specification, Recursive Algorithms, Performance Analysis: Space Complexity -Time Complexity-Asymptotic Notations	12
<b>II</b>	Graphs: Introduction -Definition -Graph Representations. Divide and Conquer: General Method-Binary Search -Merge Sort, Quick Sort, Selection Sort	13
<b>III</b>	The Greedy Method: General Method -Knapsack Problem-Job Sequencing with Deadlines, Minimum Cost Spanning Trees: Prim's Algorithm -Kruskal's Algorithm - Optimal Merge Patterns -Single Source Shortest Paths	15
<b>IV</b>	Dynamic Programming: General Method -Multistage Graphs – All-Pair Shortest Paths - Optimal Binary Search Trees -Travelling Salesperson Problem	12
<b>V</b>	Backtracking: General Method - 8 Queens Problem - Sum of Subsets -Graph Coloring -Hamiltonian Cycles	12
<b>Total Contact Hours</b>		<b>64</b>
<b>Text Book:</b>  Ellis Horowitz, Sartaj Sahni, SanguthevarRajasekaran, Fundamentals of Computer Algorithms, 2/e, Universities Press, 2007.		
<b>References:</b> 1. Alfred Aho, John E. Hopcroft, Jeffrey D. Ullman, The Design and Analysis of Computer Algorithms, Pearson Education, 2004 2. Sara Base, Allen Van, Computer Algorithms, Introduction to Design and Analysis, 3/e, Pearson Education, 2002. 3. T. H. Cormen, C. E. Leiserson, R.L.Rivest and C. Stein, Introduction to Algorithms, 2/e, Prentice Hall of India Pvt. Ltd, 2003.		

<b>Course Outcomes</b>	<p><b>On successful completion of the course, the students will be able to</b></p> <p><b>CO1:</b> Compute time and space complexities and demonstrate the fundamental principle of recursion and its effectiveness through typical examples</p> <p><b>CO2:</b> Use the various graph representations and sorting techniques</p> <p><b>CO3:</b> Apply the procedure of Greedy method and its application in solving problems</p> <p><b>CO4:</b> Illustrate the concept of Dynamic programming with suitable applications</p> <p><b>CO5:</b> Demonstrate the principle of Backtracking and its application in solving typical problems like 8-Queens problem and Sum of Subsets problem</p>
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**Mapping of COs with PSOs:**

CO Vs PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	2
CO3	3	3	2	3	2
CO4	3	3	2	3	2
CO5	3	3	2	3	2

<b>Course Code &amp; Title</b>	<b>18MCAP0104 MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>I</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Identify the normal forms, Mathematical Logic, the predicate calculus <b>K-2:</b> Discuss the basic concepts of Set theory functions and Graph theory <b>K-3:</b> Compute the Eigen Values, Eigen Vectors and Rank of the matrices			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>Identify the Mathematical Logics, the predicate calculus and the inference theory</li> <li>Discuss the basic concepts, some operations, Relations of set theory</li> <li>Describe the function, composition of function, Inverse functions and characteristic functions</li> <li>Compute Eigen Values, Eigen Vectors and rank of the matrices</li> <li>Explain the concepts of Graph, Path, Tree, Bridges, Fusion and matrices Representation of graphs.</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Mathematical Logic</b>	12
	Mathematical Logic – Statements and Notations –Connectives. Normal Forms-The Theory of Inference for the Statement Calculus The Predicate Calculus - Inference Theory and Predicate Calculus	
<b>II</b>	<b>Set Theory</b>	12
	Set Theory: Basic Concepts of Set Theory, Notation, Inclusion and Equality of Sets - The Power Set, Some Operations of Sets, Venn Diagrams, Some Basic Set Identities, The Principles of Specification, Ordered Pairs and N-Tuples - Cartesian Products – Relations and Ordering – Relations, Properties of Binary Relations in a Set, Relation Matrix and the Graph of a Relation, Partition and Covering of a Set, Equivalence Relations, Compatibility Relations, Composition of Binary Relations, Partial Ordering, Partially Ordered Set: Representation and Associated Terminology	
<b>III</b>	<b>Functions</b>	13
	Definition and Introduction, Composition of Functions Inverse Functions, Binary and N-ary Operations Characteristic Function of a Set, Hashing Functions Natural Numbers - Peano's Axioms and Mathematical Induction	

IV	<b>Matrices</b>	13
	Matrices: Matrix Operations - Rules of Matrix Arithmetic - Eigen Values and Eigen Vectors Diagonalization Theorem (Problem only, No Proof) and Rank Cayley Hamilton theorem– Problems	
V	<b>Graph Theory</b>	14
	Graph as Models – Vertex degrees Subgraph – Path - Cycle - Matrix Representation of graphs- Fusion – Trees & Connectivity - Bridges – Spanning Trees – Connector Problem – Kruskal’s Algorithm – Priori’s Algorithm	
<b>Total Contact Hours</b>		<b>64</b>
<p><b>Text Books:</b></p> <ol style="list-style-type: none"> <li>1. J.B.Tremblay and R.Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw– Hill International Edition, 1987</li> <li>2. Howard Anton, Elementary Linear Algebra, 4/e, John Wiley &amp; Sons, 1984.</li> <li>3. Arumugam S Issac, Modern Algebra, SCI Tech Publications, 2008.(For unit II,III)</li> <li>4. John Clark, A First Look at Graph Theory, Allied Publisher’s Ltd.(For unit V, Section 1.1 to 1.8 &amp; 2.1 to 2.4)</li> </ol> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. D.Alan, L.Lenneth, Applied Discrete Structures for Computer Science, Galgotia Publications, 1983.</li> <li>2. J.E. Hopcroft and J.D. Ullman, Addison Formal Languages and their Relations to Automata, Wesley Publishing Company, 1969.</li> <li>3. C.Liu and D. Mohapatra, Elements of Discrete Mathematics, McGraw Hill, 2008.</li> </ol>		
<b>Course Outcomes</b>	<p><b>On successful completion of the course, the students will be able to</b></p> <p><b>CO1:</b> Understand the Mathematical Logical</p> <p><b>CO2:</b> Discuss the Basic concepts of set theory</p> <p><b>CO3:</b> Describe about the function</p> <p><b>CO4:</b> Compute the different Values of Matrices</p> <p><b>CO5:</b> Explain about graph theory</p>	

**Mapping of COs with PSOs:**

CO Vs PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	2	1
CO2	3	3	2	1	1
CO3	3	3	1	2	2
CO4	3	3	2	1	1
CO5	2	3	1	2	2

<b>Course Code &amp; Title</b>	<b>18COPP01A1 ACCOUNTING AND FINANCIAL STATEMENT ANALYSIS</b>		
	<b>Credits:4</b>		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>I</b>
<b>Cognitive Level</b>	<p><b>K-2:</b> Explain the principles, concepts and conventions of accounting.</p> <p><b>K-4:</b> Preparing the final accounts and balance sheet of business and service organisations, Analyse the Financial Statements using appropriate accounting tools and draw accounting based information, Prepare the cost sheets from the accounting data and information and draw cost accounting information</p> <p><b>K-5:</b> Analyse the Financial Statements using appropriate accounting tools and draw accounting based information, Prepare the cost sheets from the accounting data and information and draw cost accounting information, Apply accounting in computerized environment</p>		
<b>Course Objectives</b>	<p><b>The Course aims to</b></p> <ul style="list-style-type: none"> <li>• Understand the principles, concepts and conventions of Accounting</li> <li>• Prepare and analyse the Financial Statements using appropriate accounting tools</li> <li>• Prepare cost sheets and make cost analysis</li> <li>• Apply the accounting concepts in a computerized environment</li> </ul>		

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Introduction to Accounting &amp; Accounting Principles</b>	13
	Definition, Meaning and Objects of Accounting, Systems of Accounting, Branches of Accounting, Accounting Cycle, Functions of Accounting, Advantages and Disadvantages of Accounting, Accounting Principles : Concepts and Conventions, Computerisation of Accounting, Advantages and Limitations	
<b>II</b>	<b>Recording of Business Transactions &amp; Journal and Subsidiary Books</b>	12
	Identification & Analysis of Transactions, Journal and Subsidiary Books, Journalizing, Posting, Balancing and Preparation of Trial Balance, The concept of Error and their Rectification	
<b>III</b>	<b>Financial Statements</b>	13
	Meaning and Nature of Financial Statements, Final Accounts and Balance Sheet, Limitations of Financial Statements, Analysis and Interpretation of Financial Statements, Meaning and Purpose, Tools and Methods of Financial Statement Analysis, Comparative Statements, Common size Statements	
<b>IV</b>	<b>Ratio Analysis</b>	13
	Ratio Analysis, Funds flow statements, Cash flow statements.	



<b>V</b>	<b>Cost Accounting</b>	14
	Cost Accounting: Meaning and Purpose of Costing, Labour and Overheads, Classification of Costs, Preparation and Analysis of Cost Sheet	
<b>Total Contact Hours</b>		<b>64</b>
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Arora M.N, (2010) Cost and Management Accounting: Theory and Problems, Himalaya Publishing House, Mumbai.</li> <li>2. Jain, S.P. K.L, (2009). Narang and Simi Agarwal, Accounting for Management, Kalyani Publishers, New Delhi.</li> <li>3. Maheswari S.N and S.K. Maheswari () 2005 Financial Accounting, Vikas Publishing House, New Delhi.</li> <li>4. Nagarathinam S, (1989) Financial Management and Holding Company Accounting, S. Chand Co., New Delhi.</li> </ol>		
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Explain the principles, concepts and conventions of accounting.</p> <p><b>CO2:</b> Preparing the final accounts and balance sheet of business and service organisations</p> <p><b>CO3:</b> Analyse the Financial Statements using appropriate accounting tools and draw accounting based information</p> <p><b>CO4:</b> Prepare the cost sheets from the accounting data and information and draw cost accounting information</p> <p><b>CO5:</b> Apply accounting in computerized environment</p>	

**Mapping of COs with PSOs:**

CO Vs PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	3	3	1
CO2	3	1	3	3	1
CO3	3	3	3	3	1
CO4	3	3	3	3	1
CO5	3	3	3	3	1

<b>Course Code &amp; Title</b>	<b>18MCAP0105 LAB – I: C PROGRAMMING &amp; ALGORITHMS</b>			<b>Credit: 1</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>I</b>	
<b>Cognitive Level</b>	<b>K-3:</b> Apply the theoretical knowledge on C language to solve mathematical, scientific and business <b>K-4:</b> Analyse the requirements of problems premier computational algorithms to implement using C language			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Give a strong foundation on the structured programming using C language.</li> <li>• Provide hands-on training in C Programming</li> <li>• Train the students to develop smart Computational solutions through C Programming</li> <li>• Impart practical knowledge on data storage and management in C Programming</li> <li>• Provide hands-on training to implement prominent Computational Algorithms, using C Programming.</li> </ul>			

<b>S. No.</b>	<b>CONTENTS</b>	<b>No. of Hours</b>
<b>I</b>	<b>C Programs with</b> <ol style="list-style-type: none"> <li>1. Control Structures: while, do...while, for, if...else, switch, continue, break</li> <li>2. Array Handling: One dimensional and Multidimensional</li> <li>3. Pointers</li> <li>4. Functions: Simple and Recursive Functions, Functions with Pointers</li> <li>5. File Handling</li> <li>6. Simple Graphics</li> </ol>	<b>24</b>
<b>II</b>	<b>Algorithms</b> <ol style="list-style-type: none"> <li>1. Knapsack problem</li> <li>2. Prim's algorithm</li> <li>3. Multistage graphs</li> <li>4. All pairs shortest paths</li> <li>5. 8 Queens problem</li> <li>6. Sum of Subsets</li> <li>7. Hamiltonian Cycle</li> <li>8. Sorting – Heap, Merge, Selection, Quick</li> </ol>	<b>24</b>
<b>Total Conduct Hours</b>		<b>48</b>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Use the pre-processors, basic and derived data types for problem Solving using C</p> <p><b>CO2:</b> Implement C Programs with arrays, functions, structures and pointers</p> <p><b>CO3:</b> Exhibit ability to handle files</p> <p><b>CO4:</b> Develop aptitude to implement data structure algorithms.</p> <p><b>CO5:</b> Exhibit ability to program, execute and understand the Complexity of sorting/searching algorithms</p> <p><b>CO6:</b> Develop C programs for Graphics handling</p> <p><b>CO7:</b> Contextually use premier algorithms for problem solving</p>
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**Mapping of COs with PSOs:**

CO Vs PSO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	2
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	2
<b>CO4</b>	3	3	3	3	2
<b>CO5</b>	3	3	3	3	3
<b>CO6</b>	3	3	3	3	2

<b>Course Code &amp; Title</b>	<b>18MCAP0106 LAB – II: MULTIMEDIA</b>			<b>Credit: 1</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>I</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Recall the usage of multimedia contents creation and editing tools <b>K-2:</b> Practice simple multimedia applications <b>K-3:</b> Develop efficient multimedia products			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Demonstrate simple 2D animations using animation software</li> <li>• Prepare simple scenes using image editing software</li> <li>• Model simple multimedia applications</li> <li>• Discuss team work towards the development of multimedia products</li> </ul>			

<b>S. No.</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	Tools and workspace utilization Animation	10
<b>II</b>	Graphics effects	08
<b>III</b>	Text effects Importing Audio and Video	10
<b>IV</b>	Action Script Publishing Flash content	10
<b>V</b>	Mini project (Team Work)	10
<b>Total Conduct Hours</b>		<b>48</b>
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b>  <b>CO1:</b> Image and sound editing operations <b>CO2:</b> Develop animation products <b>CO3:</b> Develop interactive multimedia products such as games <b>CO4:</b> Develop web based products <b>CO5:</b> Develop & design multimedia products	

**Mapping of COs with PSOs:**

<b>CO Vs PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	1	1	3	3
<b>CO2</b>	3	1	1	3	3
<b>CO3</b>	3	1	1	3	3
<b>CO4</b>	3	1	1	3	3
<b>CO5</b>	3	1	1	3	3

## SEMESTER II

<b>Course Code &amp; Title</b>	<b>18MCAP0207 OBJECT ORIENTED PROGRAMMING IN C++</b>		
	<b>Credits: 4</b>		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>II</b>
<b>Cognitive Level</b>	<b>K-1:</b> Recognize the programming concepts. <b>K-2:</b> Practice the object oriented concepts in C++ programming. <b>K-3:</b> Design the object oriented applications.		
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Demonstrate the difference between traditional imperative design and object-oriented design.</li> <li>• Discuss the usage of function in C++ and usage of user defined data type class to create objects.</li> <li>• Explain the efficient usage of memory through operators and providing new meaning to existing operators.</li> <li>• Identify the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code.</li> <li>• Explain the storage of data into file forms.</li> </ul>		

UNIT	CONTENTS	Lecture Schedule
<b>I</b>	Principles of Object–Oriented Programming : Basic Concepts of Object– Oriented Programming – Benefits, Object–Oriented Languages – Applications of OOP, Beginning with C++ – Tokens, Expressions and Control Structures	13
<b>II</b>	Functions in C++, Classes and Objects – Specifying a Class – Declaring Objects – Defining Member Functions, Static Data Members and Member Functions – Array of Objects -Friendly functions – const Member Functions, Data Members and Objects, Constructors – Constructor Types, Destructors.	13
<b>III</b>	Operator Overloading and Inheritance: Defining Operator Overloading – Overloading Unary Operators, Overloading Binary Operators – Manipulation of String using Operators, Inheritance – Defining Derived Class – Protected Derivation - Single Inheritance - Multilevel Inheritance – Multiple Inheritance, Hierarchal Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract Class – Constructors in Derived Class.	13
<b>IV</b>	Pointers – new and delete operators, Pointers to Objects – this Pointer, Pointers to Derived Classes, Virtual Functions – Pure Virtual Functions.	13
<b>V</b>	Working with Files: Classes for File Stream Operations – Opening and Closing a File, File Pointers and their Manipulations, Sequential Input and Output Operations – Error Handling during File Operations, Command Line Arguments	12
<b>Total Conduct Hours</b>		<b>64</b>

**Text Book:**

E. Balagurusamy, Object Oriented Programming with C++, 4/e, Tata McGraw Hill publishing Company Limited, New Delhi, 2008.

**References:**

1. Bjarne Stroustrup, The C++ Programming Language, Addison– Wesley Publishing Company, New York, 1994.
2. HM Deitel and PJ Deitel, C++ How to Program, 7/e, Prentice Hall, 2010.
3. Yashavant P. Kanetkar, Let Us C++, BPB Publications, 1999.

**Course Outcomes**

**On completion of the course, students should be able to**

**CO1:** Apply class structures as fundamentals’ and modular building blocks for real time applications

**CO2:** Develop solutions for the problems using basic oops concepts

**CO3:** Identify the difference between static and dynamic binding. Apply both techniques to solve problems.

**CO4:** Analyse generic data type for the data type independent programming which relate it to reusability.

**CO5:** Apply file forms to handle large data set.

**Mapping of COs with PSOs:**

CO Vs PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	2
CO2	3	3	2	3	2
CO3	3	3	2	3	2
CO4	3	3	2	3	2
CO5	3	3	2	3	2

<b>Course Code &amp; Title</b>	<b>18MCA0208 OPERATING SYSTEMS</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>II</b>	
<b>Cognitive Level</b>	<b>K-2:</b> Understand the elements and framework of operating system <b>K-3:</b> Apply the OS algorithms on the simulated problems			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Provide in-depth knowledge on basic design and working principles of operating systems</li> <li>• Learn the functional components of some common operating systems</li> <li>• Impart a knowledge on the developments recent in the arena of operating systems</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Introduction</b>	12
	Operating Systems - Computer-System Organization - Computer-System Architecture - Operating-System Structure - Operating-System Operations - Process Management - Memory Management - Storage Management - Protection and Security - Kernel Data Structures - Computing Environments - Open-Source Operating Systems	
<b>II</b>	<b>Operating System Structures</b>	12
	Operating-System Services - User Operating-System Interface - System Calls - Types of System Calls - System Programs - Operating-System Design and Implementation - Operating-System Structure - Operating-System Debugging - Operating-System Generation - System Boot	
<b>III</b>	<b>Processes</b>	13
	Process Concept - Process Scheduling - Operations on Processes – Interprocess Communication - Examples of IPC Systems - Communication in Client- Server Systems <b>Threads - Overview - Multicore Programming - Multithreading Models - Thread Libraries - Implicit Threading - Threading Issues - Operating-System Examples</b>	
<b>IV</b>	<b>CPU Scheduling</b>	13
	Basic Concepts - Scheduling Criteria - Scheduling Algorithms -Thread Scheduling - Multiple-Processor Scheduling - Real-Time CPU - Scheduling - Operating-System Examples <b>Deadlocks - System Model - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock</b>	

<b>V</b>	<b>Memory Management</b>	14
	Main Memory Background – Swapping - Contiguous Memory - Allocation - Segmentation - Paging - Structure of the Page Table <b>Virtual Memory</b> Background - Demand Paging - Copy-on-Write - Page Replacement - Allocation of Frames -Thrashing - Memory-Mapped Files - Allocating Kernel Memory - Other Considerations - Operating-System Examples	
<b>Total Contact Hours</b>		<b>64</b>

**Text Book:**

Silberschatz, Galvin & Gagne, Operating System Concepts, 10/e John Wiley & Sons, Inc., 2018.

**References:**

1. William Stallings, Operating Systems Internals and designs Principles, 7<sup>th</sup> ed, Prentice Hall, 2012.
2. Andrew S. Tanenbaum, Modern Operating Systems, Fourth Edition, Pearson Education, Global edition, 2015
3. [https://www.tutorialspoint.com/operating\\_system/index.htm](https://www.tutorialspoint.com/operating_system/index.htm)
4. <http://www.svecw.edu.in/Docs%5CCSEOSLNotes2013.pdf>

**Course Outcomes**

**On successful completion of the course, the students will be able to**

- CO1:** Describe the types of operating systems  
**CO2:** Summaries the basic structure, principles, functions and Mechanism of the modern operating systems  
**CO3:** Compare the behavior and performance of different CPU Scheduling algorithms  
**CO4:** Elucidate the concept of multiprogramming using threads  
**CO5:** Analyze the cause and effect of deadlock and its management strategies  
**CO6:** Explain memory management techniques, as well as the Mechanism of virtual memory management

**Mapping of COs with PSOs:**

CO Vs PSO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	2	2	2	3
<b>CO2</b>	3	3	3	2	2
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	2	3
<b>CO5</b>	3	3	3	3	3
<b>CO6</b>	3	3	2	3	3



<b>Course Code &amp; Title</b>	<b>18MCAP0209 DATA AND FILE STRUCTURES</b>		
	<b>Credits: 4</b>		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>II</b>
<b>Cognitive Level</b>	<b>K-1:</b> Explain the different types of data structure. <b>K-2:</b> Choose the appropriate data structure for effective implementation of an application. <b>K-3:</b> Compare and justify the use of data structure for a specific application.		
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Explain the design and implementation of basic and advanced data structures.</li> <li>• Describe various techniques for representation of the data in the real world.</li> <li>• Prepare the students to choose the appropriate representation of data structures and their applications</li> </ul>		

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Arrays:</b> Definition- <b>One dimensional array:</b> Memory allocation for an array -Operations on arrays -Applications of arrays. <b>Multidimensional array:</b> Two dimensional arrays -Sparse matrices-Three dimensional and n-dimensional arrays	12
<b>II</b>	<b>Linked Lists:</b> Single linked list -Circular linked list -Double linked lists-Circular double linked list Applications of linked list	12
<b>III</b>	<b>Stack :</b> Definition -Representation of a Stack -Operations on Stack -Applications of Stacks <b>Queue :</b> Definition -Representation of Queues -Various Queue structures-Applications of Queues	14
<b>IV</b>	<b>Trees and Hash Tables:</b> Definition and Concepts - Representations of binary tree -Operations on a binary tree Binary tree traversal -Types of Binary trees – Expression Tree – Binary Search Trees – Heap Tree - Trees and Forests Hash Tables	13
<b>V</b>	<b>File Structures:</b> Physical Files and Logical Files -Opening Files -Closing Files -Reading and Writing -Seeking -Special Characters in Files -The Unix Directory Structure-Physical Devices and Logical Files -File Related Header Files -Unix File System commands <b>Field and Record Organization:</b> Field structures, Record structures-Indexed Sequential Access <b>Maintaining a Sequence Set:</b> Use of Blocks -Adding a simple index to the sequence set	13
<b>Total Conduct Hours</b>		<b>64</b>

**Text Books:**

1. Debasis Samanta, Classic Data Structures, PHI Learning Pvt. Ltd., Second Edition, 2009.
2. Michael J.Flok, Bill Zoellick, Greg Riccardi, File Structures – An Object – Oriented Approach with C++, Pearson Edition, 2005.

**References:**

1. Horowitz, Shani, Dinesh Mehta, Fundamentals of Data Structures in C++, Galgotia Publications, 2008.
2. Yedidhayah Langsam, Moshe, J.Augenstien, Aaron M.Tanebaum, Data Structures using C and C++,2/e, PHI, 1999.
3. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, AWL Publications 1994.

**Course Outcomes****On completion of the course, students should be able to**

- CO1:** Describe the representation of single dimensional and multi-Dimensional arrays and their applications  
**CO2:** Formulate the data representation using linked list and its variants  
**CO3:** Demonstrate primitive operations of Stacks and Queues  
**CO4:** Relate the various types of binary trees and illustrate binary tree traversals with algorithms and examples  
**CO5:** Summarize the different types of file structures

**Mapping of COs with PSOs:**

CO Vs PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	2	2
CO2	2	2	3	3	2
CO3	2	2	3	3	2
CO4	3	3	3	2	2
CO5	3	2	2	2	2

<b>Course Code &amp; Title</b>	<b>18MCAP0210 MICROPROCESSORS AND APPLICATIONS</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>II</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Define the basic elements of Microprocessors <b>K-2:</b> Describe the working principles and interfaces of Microprocessors <b>K-3:</b> Apply the concepts and write simple programs to solve computational problems using Assembly Language Programming			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• List different types of Microprocessors</li> <li>• Write Programmes using Assembly language programming (ALP)</li> <li>• Explain the Interconnection of Microprocessor with other devices</li> <li>• Describe the functionalities of internal units</li> <li>• Explain the operations in the interfacing</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Introduction</b>	12
	Computers, Microprocessors, and Microprocessors - an Introduction - Computers - The 8086, 8088, 80186, 80188, 80286 Microprocessors Introduction - 8086 Internal Architecture - Introduction to programming the 8086 8086 Family Assembly language programming Introduction - Program Development steps - Constructing the Machine Codes for 8086 instructions - Writing Programs for use with an assembler - Assembly language program development tools.	
<b>II</b>	<b>8086 Assembly Language Programming Techniques</b>	13
	8086 assembly language programming Techniques- objectives Practice with simple sequence programs - Flags, Jumps and WHILE - DO implementations - REPEAT-UNTIL implementation and examples - Debugging assembly language programs	
<b>III</b>	<b>Conditional Statements</b>	13
	IF-THEN-ELSE structures - procedures and Macros - IF-THEN IF-THEN and multiple IF THEN-ELSE programs - Writing and using procedures - Writing and using assembler macros	
<b>IV</b>	<b>8086 Instruction Descriptions and Assembler Directives</b>	12
	8086 Instruction Descriptions and Assembler Directives Unix operating system - Structure, operations of the Kernel shell, application layer. 80286 microprocessor – architecture - Real address mode - memory management scheme - Descriptors - accessing segments Address translation registers and physical address - Protection mechanisms - task switching and task gates - Interrupt handling in PVAM - instructions for PVAM.	

V	<b>Digital Interfacing</b>	13
	Digital Interfacing – Objectives - Programmable parallel ports and handshake - Input/output - Interfacing a microprocessor to keyboards - Interfacing to alphanumeric ports to high power devices - Optical motor shaft encoders	
<b>Total Contact Hours</b>		<b>64</b>
<p><b>Text Book:</b></p> <p>D.V. Hall, Microprocessors and Interfacing - Programming and Hardware, Seventh Reprint, Tata McGraw Hill Edition, New Delhi, 1995.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. A.P. Mathur, Introduction to Microprocessors, 3/e, Tata McGraw Hill Company Limited, New Delhi 1994.</li> <li>2. Mohamed Rafiqzzman, Microprocessor and Micro Computer based System Design, 2/e, CRC Press, 1995.</li> <li>3. B. Kauler, PC Architecture &amp; Assembly Language, Galgotia Publication, New Delhi, 1995.</li> </ol>		
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Differentiate types of Microprocessors</p> <p><b>CO2:</b> Recognize the basics of Assembly language programming (ALP)</p> <p><b>CO3:</b> Write simple programmes in ALP</p> <p><b>CO4:</b> Explain the Architecture of advance Microprocessors</p> <p><b>CO5:</b> Describe the interconnection of Microprocessor with other Device</p>	

**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	-	1	-	2
CO2	3	3	2	2	2
CO3	3	3	2	2	2
CO4	3	-	1	-	2
CO5	3	-	1	-	2

<b>Course Code &amp; Title</b>	<b>18MATP02A1 NUMERICAL AND STATISTICAL METHODS</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>II</b>	
<b>Cognitive Level</b>	<b>K-1:</b> List the Iteration Methods <b>K-2:</b> Discuss the Newton's formula to interpolate the intervals <b>K-3:</b> Describe frequency distribution and correction			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• List the methods of Least Squares and the iteration methods</li> <li>• Describe the Newton's interpolating formula for the intervals</li> <li>• Compute the Measures of Central Value, standard deviation and skewness for the distributions</li> <li>• Compute the correlation, Rank correlation an Regression</li> <li>• Distinguish between the Binomial distribution and the Poisson distribution</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Curve Fitting</b>	14
	Curve Fitting: Methods of Least Squares- Fitting Straight Line-Fitting a Parabola-Fitting an Exponential Curve Solution of Numerical and Transcendental Equations: The Bisection Method-Method of False Position Solution of Simultaneous Linear Algebraic Equations: Gauss Elimination Method- Gauss Jordan Method- Jacobi Method of Iteration, Gauss Seidel Method - Related problems	
<b>II</b>	<b>Interpolation</b>	12
	Interpolation : Difference Tables-Newton's Forward and Backward Interpolation Formula for Equal Intervals - Lagrange's Interpolation Formula for Unequal interval - Numerical Integration: Trapezoidal Rule- Simpson's 3/8 <sup>th</sup> Rule - Related problems	
<b>III</b>	<b>Frequency Distribution</b>	13
	Frequency Distribution: Diagramatic Graphical Presentation of Frequency Distributions - Measures of Central Value - Standard Deviation - Coefficient of Variance - Skewness – Kurtosis	
<b>IV</b>	<b>Correlation</b>	12
	Correlation: Scatter Diagram- Karl Pearson's Coefficient of Correlation- Correlation Coefficient for a Bivariate frequency Distribution - Rank Correlation – Regression - Related problems	

<b>V</b>	<b>Probability</b>	13
	Probability: Introduction-Calculation of Probability Conditional Probability: Bayes' Theorem- Mathematical Expectation Theoretical Distributions: Binomial Distribution-Poisson Distributions Related problems	
<b>Total Contact Hours</b>		<b>64</b>
<p><b>Text Books:</b></p> <ol style="list-style-type: none"> <li>1. M.K. Venkataraman, Numerical Methods in Science and Engineering, 2/e, National Publishing Co., Madras, 1987, (Unit 1 &amp; Unit 2).</li> <li>2. Arumugam S. Issac, Statistics, SCI Tech Publications, 2011, (Unit 3: Chapters 1,2,3,4 Unit 4: Chapter 6 Unit 5: Chapter 11 Chapter 12- Secs 12.1-12.4, Chapter 13- Secs 13.1,13.2).</li> </ol> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. M.K.Jain, S.R.K. Iyengar, R.K. Jain, Numerical Methods for Scientific and Engineering Computation, Willey Eastern Limited, 2003.</li> <li>2. S.S. Sastry, Introductory Methods of Numerical Analysis, Prentice – Hall of India, 4<sup>th</sup> Edition, 2010.</li> </ol>		

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> List the Iteration Methods  <b>CO2:</b> Describe the Interpolation formulae  <b>CO3:</b> Compute the Measures of Central Value, Standard deviation and skewness  <b>CO4:</b> Compute Correction and Regression  <b>CO5:</b> Distinguish between the Binominal distribution and Poisso Distribution</p>
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**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO1</b>	3	3	3	2	2
<b>CO2</b>	3	3	3	2	1
<b>CO3</b>	3	3	3	2	-
<b>CO4</b>	3	3	3	1	1
<b>CO5</b>	3	2	3	1	1

<b>Course Code &amp; Title</b>	<b>18MCAP0211 LAB III: C++ PROGRAMMING &amp; DFS</b>			<b>Credit: 1</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>II</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Recognize the programming concepts. <b>K-2:</b> Practice the object oriented concepts in C++ programming. <b>K-3:</b> Identify and use the data structure for algorithm development			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Demonstrate the difference between traditional imperative design and object-oriented design.</li> <li>• Discuss the usage of function in C++ and usage of user defined data type class to create objects.</li> <li>• Explain the efficient usage of memory through operators and providing new meaning to existing operators.</li> <li>• Identify the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code.</li> <li>• Illustrate the effective use of appropriate data structures depending upon the specific problem</li> </ul>			

<b>S. No.</b>	<b>CONTENTS</b>	<b>No. of Hours</b>
<b>I</b>	<b>C++ programs with</b> <ol style="list-style-type: none"> <li>1. Operator Overloading</li> <li>2. String Manipulation</li> <li>3. Inheritance – Single and Multiple</li> <li>4. Pointers</li> <li>5. Virtual Functions</li> <li>6. Files and Streams</li> </ol>	24
<b>II</b>	<b>Data Structures</b> <ol style="list-style-type: none"> <li>1. Stack –Creation, push and pop, conversion and evaluation of prefix and postfix expression.</li> <li>2. Queues- Creation, Insertion, Deletion</li> <li>3. Linked list- Creation, Insertion, Deletion using Singly Linked List, Circularly List and Doubly- Linked list.</li> <li>4. Binary Trees –Creation, Tree traversals.</li> <li>5. Binary Search Tree – Creation, Searching and Deleting an element</li> </ol>	24
<b>Total Conduct Hours</b>		<b>48</b>

**References:**

1. E.Balagurusamy, Object Oriented Programming with C++, 4/e, Tata McGraw Hill publishing Company Limited, New Delhi, 2008.
2. Bjarne Stroustrup, The C++ Programming Language, Addison – Wesley Publishing Company, New York, 1994.
3. HM Deitel and PJ Deitel, C++ How to Program, 7/e, Prentice Hall, 2010.
4. Yashavant P. Kanetkar, Let Us C++, BPB Publications, 1999.
5. Debasis Samanta, Classic Data Structures, PHI Learning Pvt. Ltd., Second Edition, 2009
6. E.Balagurusamy, Object Oriented Programming with C++, 4/e, Tata McGraw Hill publishing Company Limited, New Delhi, 2008.
7. Bjarne Stroustrup, The C++ Programming Language, Addison – Wesley Publishing Company, New York, 1994.
8. HM Deitel and PJ Deitel, C++ How to Program, 7/e, Prentice Hall, 2010

**Course Outcomes****On completion of the course, students should be able to****CO1:** Apply class structures as fundamentals' and modular building blocks for real time applications**CO2:** Develop solution for the problem using basic OOPS concepts**CO3:** Interpret the difference between static and dynamic binding. Apply both techniques to solve problems.**CO4:** Choose appropriate data structures to represent data items in real world problems.**CO5:** Design programs using a variety of data structures such as Stacks, Queues, and Binary trees.**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	3	2
CO2	3	3	2	3	2
CO3	3	3	2	3	2
CO4	3	3	2	3	2
CO5	3	3	2	3	2



<b>Course Code &amp; Title</b>	<b>18MCAP0212 LAB – IV: SHELL PROGRAMMING &amp; ALP</b> Credit: 1		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>II</b>
<b>Cognitive Level</b>	<b>K-2:</b> Understand the structure, operations and commands of Linux & Assembly languages Programmed <b>K-3:</b> Apply the knowledge in problem solving		
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Teach the Shell commands of Linux operating system</li> <li>• Offer hands-on training on Linux Shell Programming</li> <li>• Familiarize the students on problem solving thro' assembly Language programming</li> <li>• Provide hands-on training assembly Language programming Microsoft Micro Assembler – (MASM)</li> </ul>		

<b>S. No.</b>	<b>CONTENTS</b>	<b>No. of Hours</b>
<b>I</b>	<b>Shell Programming</b>	
	1. Shell Programming Vi Editor Command	4
	2. Operations on Directories and Files	4
	3. Working with Editors	4
	4. GUI Operations	4
<b>II</b>	5. Shell Programming	4
	<b>ALP using MASM</b>	
	1. Simple Sequence Programming	4
	2. Branching, Jumping and Looping	4
	3. Programming with Macro	4
	4. Use of Subroutines	4
5. Use of Assembler Directives	4	
6. Applications – Simple Multiplication, Sorting, Binary to BCD and BCD to Seven Segment Code	4	
<b>Total Contact Hours</b>		<b>48</b>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Use shell commands, Vi editor commands and command-line arguments appropriately</p> <p><b>CO2:</b> Design and Develop shell scripts with conditional, Control statements and shell functions for problem solving</p> <p><b>CO3:</b> Exhibit ability to perform the file management and multiple tasks using shell scripts in Linux environment</p> <p><b>CO4:</b> Exhibit ability to implement scheduling algorithms</p> <p><b>CO5:</b> Develop simple programs for problem-solving using Microsoft Macro Assembler (MASM)</p> <p><b>CO6:</b> Exhibit ability to define and use Macros and Subroutines</p>
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**Mapping of COs with PSOs:**

<b>CO Vs PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	2	2
<b>CO2</b>	3	3	3	2	3
<b>CO3</b>	3	3	3	2	2
<b>CO4</b>	3	3	3	2	3
<b>CO5</b>	3	3	3	2	3
<b>CO6</b>	3	3	3	2	2

<b>Course Code &amp; Title</b>	<b>18ENGP00C1 COMMUNICATION AND SOFT SKILLS</b>			<b>Credits: 2</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>II</b>	
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Develop interpersonal skills and be an effective goal oriented employee.</li> <li>• Expose them to professional communication.</li> <li>• Improve their ability to communicate in everyday circumstances.</li> <li>• Enable the students to acquire the interview skills</li> <li>• Giving them the strength to develop their career.</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
I	Basics of Communication - Barriers to Communication	6
II	Communication and Language Skills - Communication in a Global Language	6
III	Resumes and Cover Letters - Group Discussions	6
IV	Business Communication - Intercultural Communication	6
V	Professional Communication - interviews	8
<b>Total Contact Hours</b>		<b>32</b>

<b>Text Book:</b>	
Dhariwal Krishnaswamy and Krishnaswamy – Mastering Communication Skills and Soft Skills.	
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> Demonstrate critical and Innovative thinking. <b>CO2:</b> Display competence in oral, written and visual communication. <b>CO3:</b> Apply communication theories to be an effective communication. <b>CO4:</b> Use current technological devices to utilize the opportunities. <b>CO5:</b> Create Englishness circumstances that lead them to the successful titling their (Interview, Resume, and other communicative tools).

#### Mapping of COs with PSOs:

<b>CO Vs PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	2	2	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	2	3	3

## SEMESTER III

<b>Course Code &amp; Title</b>	<b>18MCAP0313 JAVA PROGRAMMING</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>III</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Recall the object oriented programming concepts <b>K-2:</b> Practice the Java programming <b>K-3:</b> Design applications using Java			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>Provide the foundation to the object oriented programming concepts</li> <li>Discuss the implementation of OOP concepts in Java language</li> <li>Make learners a good Java programmers</li> <li>Import skills and knowledge to create and run Java programs for solving real time problems</li> </ul>			

UNIT	CONTENTS	Lecture Schedule
<b>I</b>	Introduction – Object-Oriented Programming Concepts, Encapsulation, inheritance, polymorphism, features of Java, Types of Java programs, Java architecture, Literals - integer, floating point, character, string and boolean literals. Data types - integer, floating point, character and boolean. Variables, The structure of a Java program – comments, Expressions and Statements, Type conversion, block statements and scope, Operators –arithmetic, bitwise relational, boolean logical and Ternary. Operator precedence, Control statements – if...else, switch, while, do...while, for..., Break, continue and comma statement, Arrays - one-dimensional and multi-dimensional arrays.	13
<b>II</b>	Classes – defining a class, the new operator and objects, the dot Operator, method declaration and calling, Constructors, instance variable hiding, this in constructor, method Overloading, passing objects as parameters to methods, Inheritance – creating subclasses, method overriding, final class, Final method, final variables, Object destruction and garbage collection, recursion, static Method, static variables and static block, Package, the import statement, access modifier, interfaces, Defining interfaces, implementing an interface.	12

<b>III</b>	<p>Wrapper classes – the number class - Byte, Short, Integer, Long, Float, Double, Character and Boolean classes, Mathematical methods - exceptions -types of exceptions, Catching exceptions, nested try blocks, hierarchy of multiple catch blocks, throw statement, creating your own exceptions, throws statement, the finally block, checked and unchecked exceptions, Input and Output classes - i/o streams, the file class, byte stream, InputStream, OutputStream, disk file handling, FileInputStream, FileOutputStream, ByteArrayInputStream, ByteArrayOutputStream, filtered byte streams, BufferedInputStream, BufferedOutputStream, DataInputStream, DataOutputStream, SequenceInputStream, ObjectOutputStream, ObjectInputStream, random access file, character stream, CharArrayReaderCharArrayWriter, InputStreamReader, OutputStreamWriter, FileWriter, FileReader, BufferedReader, BufferedWriter.</p>	13
<b>IV</b>	<p>Strings – the String class, equality operator(==) and equals method, string concatenation with + , the StringBuffer class, Threads - multitasking, creating a thread, states of a thread, Multithreaded programming, thread priorities, join method, Controlling the threads, Synchronizing methods, inter–thread communication – wait, notify and notifyAll</p>	12
<b>V</b>	<p>Applets – applet basics, methods of building an applet, some General methods of applet, displaying text in status bar, Embedding applet information, The html applet tag, reading parameters into applets, colors in Applet, getting document base and codebase, Interfaces in applet, multimedia in applet, playing audio clips, Images in applet, applet showing other html pages, Graphics - drawing lines, rectangles, ovals and circles, arcs, Polygons and polyline. Creating a graphics clip, colors in graphics, constructors for Color Class, Color methods, setting paint modes, Fonts in graphics, determining fonts available - in the system - setting fonts.</p>	14
<b>Total Contact Hours</b>		<b>64</b>
<p><b>Text Book:</b> K.Somasundaram, Programming in Java2, Jaico Publishing House, New Delhi, 2009.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. K. Somasundaram, Introduction to JAVA Programming, Jaico Publishing House, New Delhi, 2013.</li> <li>2. H.Schildt, Java2: The Complete Reference, 4/e, TMH Publishing Company, New Delhi,2001.</li> <li>3. Mathew T.Nelson, Foundation Classes, McGraw–Hill, 1998.</li> <li>4. K.Somasundaram, Do ‘n’ Learn JAVA – A Practical Approach, Anuradha Publications, Chennai, 2013.</li> </ol>		

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Outline the concepts of OOP. Explain the basic Java language features, types, control statements and array.</p> <p><b>CO2:</b> Explain the idea of inheritance, package and identify classes, objects, members, of a class and the relationship among them needed for a specific problem.</p> <p><b>CO3:</b> Implement of mathematical methods, to solve engineering and Scientific problems. Discuss exception handling, thread and usage of Wrapper classes.</p> <p><b>CO4:</b> Discuss the methods in String. Identify how threads are used to perform subtask and inter-thread communication.</p> <p><b>CO5:</b> Develop client side programming using an applet with graphics objects using AWT.</p>
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**Mapping of COs with PSOs:**

<b>CO Vs PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3

<b>Course Code &amp; Title</b>	<b>18MCAP0314 PRINCIPLES OF COMPILER DESIGN</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>III</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Recall the basic elements of Compiler <b>K-2:</b> Identify with the working principles and interfaces of Compilers <b>K-3:</b> Apply and analyze the operations performed by compiler			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>Define the design and intrinsic functioning of compilers</li> <li>Identify the purpose and functions of phases of the compiler</li> <li>Describe the Contents and data structures for Symbol table with errors</li> <li>Identify the Problems in code generation and register allocation and assignment</li> <li>Explain the process of compilation of a source program with reference to common programming languages.</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Fundamentals of a Compiler</b>	13
	Structure of a Compiler - Lexical Analysis – Syntax Analysis – Intermediate Code Generation – Optimization - Code Generation – Bookkeeping – Error Handling - Compiler Writing Tools - Role of Lexical Analyzer - A Simple Approach to the Design of Lexical Analyzer - Regular Expressions - Finite Automata – Conversion from Regular Expressions to Finite Automata – Minimizing the Number of States of a DFA - Language to Specify Lexical Analyzer – Implementation of a Lexical Analyzers.	
<b>II</b>	<b>Context-Free Grammars</b>	19
	Context-Free Grammars - Derivations and Parse Trees - Capabilities of Context – Free Grammars - Parsers : Shift-Reduce Parsing - Operator Precedence Parsing - Top Down Parsing - Predictive Parsers	
<b>III</b>	<b>Lexical Analyzer and Syntax Analyzer</b>	14
	LR Parsers – Canonical Collection of LR(0) Items - Constructing SLR Parsing Tables - Canonical LR Parsing Table - LALR Parsing Tables Syntax Directed Translation Schemes - Implementation of Syntax Directed Translators – Intermediate Code – Postfix Notation - Parse Trees and Syntax Trees - Three Address Code, Quadruple and Triples - Translation of Assignment Statements – Boolean Expressions	
<b>IV</b>	<b>Symbol Table</b>	8
	Contents of Symbol Table - Data Structures for Symbol Tables - Errors – Lexical Phase Errors - Syntactic Phase Errors – Semantic Errors	

V	<b>Object Programs</b>	10
	Object Programs – Problems in Code Generation - A Machine Model – A Simple Code Generator - Register Allocation and Assignment - Code Generation from DAG's - Peephole Optimization	
<b>Total Contact Hours</b>		<b>64</b>
<p><b>Text Book:</b></p> <p>Principles of Compiler Design, Alfred V. Aho&amp; Jeffrey D. Ullman, Narosa Publishing House, 1985.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Compiler Construction Principles and Practice – D.M.Dhamadhere, McMillan India Ltd., Madras, 1983.</li> <li>2. Compiler Design Theory, Lewis. P.M., Rosenkrantz D.J., Stearn R.E., Addison–Wesley, 1976.</li> </ol>		
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Explain the fundamentals of a compiler.</p> <p><b>CO2:</b> Discuss about the context-free grammars and various parsing techniques.</p> <p><b>CO3:</b> Describe the lexical analyzer and syntax analyzer of Compiler.</p> <p><b>CO4:</b> Explain about the types and sources of errors, from the compilers perspective.</p> <p><b>CO5:</b> Criticize the procedures and principles involved in the machine code generation.</p>	

**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	1	1	3
CO2	3	2	1	-	1
CO3	2	3	2	-	1
CO4	3	-	2	-	1
CO5	2	1	3	-	1



<b>Course Code &amp; Title</b>	<b>18MCA0315 DATABASE MANAGEMENT SYSTEMS</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>III</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Revise the basic components of database system and use of database languages <b>K-2:</b> Design the database schema for the real time application. <b>K-3:</b> Choose the appropriate database model to design the given Application <b>K-4:</b> Examine the designed databases through normalization process			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Explain the concepts of database management systems</li> <li>• Demonstrate the various data models and database systems</li> <li>• Manipulate real time data and elicit useful information using database concepts</li> <li>• Explain the concept and techniques in transaction and recovery system</li> <li>• Outline the latest design models in database design.</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Introduction:</b> Database System Applications – Purpose of Database Systems <b>Relational Model:</b> Structure of Relational Database - Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations	12
<b>II</b>	<b>Query Languages:</b> Introduction to SQL: <b>Overview of the SQL Query Languages</b> SQL Data Definition, Basic Structure of SQL Queries - Additional Basics Operations, Set Operations - Null Values, Aggregate Functions - Nested Subqueries, Modification of the Database <b>Intermediate SQL:</b> Join Expression, Views - Transactions, Integrity Constraints - Data Types and Schemas, Authorization <b>Formal Relational Languages:</b> The Relational Algebra-The Tuple Relational Calculus The Domain Relational Calculus	12
<b>III</b>	<b>Database Design:</b> Database Design and ER Model: Overview of the Design Process The Entity Relationship Model, Constraints - Removing Redundant Attributes in Entity Sets, ER Diagrams - Reduction to Relational Schemas, ER Design Issues, Extended ER Features, Alternative Notations for Modeling data, Other Aspects of Database Design <b>Relational Database Design:</b> Features of Good Relational Design-Atomic Domains and First Normal Form, Decomposition using Functional Dependencies Functional Dependencies Theory, Algorithms for Decomposition- Decomposition using Multivalued Dependencies	15

<b>IV</b>	<p><b>Transactions and Recovery:</b>  <b>Transactions:</b> Transaction Concept– Simple Transaction Model – Storage Structure - Transaction Atomicity and Durability - Transaction Isolation – Serializability - Transaction Isolation and Atomicity – Transaction Isolation Levels – Implementation of Isolation Levels – Transactions as SQL Statements  <b>Recovery Systems:</b> Failures Classification – Storage - Recovery and Atomicity – Recovery Algorithm - Buffer Management – Failure with Loss of Nonvolatile Storage - Early Lock Release and Logical Undo Operations - Remote Backup Systems</p>	13
<b>V</b>	<p><b>Distributed and Object-Based Databases:</b>  <b>Distributed Databases:</b> Homogeneous and Heterogeneous Databases - Distributed Data Storage - Distributed Transaction– Commit Protocols - Concurrency Control in Distributed Databases - Availability – Distributed Query Processing– Heterogeneous Distributed Databases - Cloud-Based Databases – Directory Systems  <b>Object–Based Databases:</b> Overview – Complex Data Types - Structured Types and Inheritance in SQL–Table Inheritance - Array and Multiset Types in SQL–Object Identity and Reference Types in SQL - Implementing O-R Features –Persistent Programming Languages Object Relational Mapping – Object-Oriented versus Object-Relational</p>	12
<b>Total Contact Hours</b>		<b>64</b>
<p><b>Text Book:</b>  Avi Silberchartz, Henry F. Korth and S.Sudarshan, Database System Concepts, 6/e, McGraw–Hill Higher Education, International Edition, 2010.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Rob, Carlos Coronel, Steven A. Morris, Keeley Crockett, Database Principles, 2/e, Peter Cengage Learning, 2013</li> <li>2. Ramez Elamassri and Shankant B–Navathe, Fundamentals of Database Systems, 6/e, Pearson Education Delhi, 2010.</li> <li>3. Peter Rob, Carlos Coronel, Database System Concepts, Cengage Learning, 2008.</li> <li>4. Lee Chao, Database Development and Management, Auerbach Publications, 2010</li> </ol>		

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Revise the components, functions and various database design techniques used for modelling the databases management system.</p> <p><b>CO2:</b> Examine the clauses and functions of SQL and write optimal queries in the above languages.</p> <p><b>CO3:</b> Design entity-relationship diagrams to represent simple database application scenarios and can apply the database schema normalization rules and techniques to criticize and improve the database design.</p> <p><b>CO4:</b> Analyse the concept of transaction processing, concurrent transaction processing and recovery procedures</p> <p><b>CO5:</b> Employ the advanced topics in database management viz. object-Relational databases and distributed databases</p>
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**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

<b>18MCAP03MX</b>	<b>MODULAR COURSE - I</b>		
<b>Credits</b>	<b>Theory: 2</b>	<b>Practical: 0</b>	<b>Total Credits: 2</b>

<b>18MCAP03EX</b>	<b>MAJOR ELECTIVE – I</b>		
<b>Credits</b>	<b>Theory: 4</b>	<b>Practical: 0</b>	<b>Total Credits: 4</b>

<b>Course Code &amp; Title</b>	<b>18MCAP0316 LAB – V: GUI &amp; RDBMS</b>			<b>Credit: 1</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>III</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Develop VB program using basic and ActiveX controls <b>K-2:</b> Design databases using MS-ACCESS and SQL <b>K-3:</b> Use appropriate queries to extract information from databases <b>K-4:</b> Generate Report from multiple relations			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Prepare the students to design VB forma for real-time applications</li> <li>• Design database schema considering the normalization rules</li> <li>• Write PL/SQL programs using Triggers, Cursors and Exception</li> <li>• Use the database from an front-end applications</li> </ul>			

<b>S. No.</b>	<b>CONTENTS</b>	<b>No. of Hours</b>
1.	<b>I. GUI (Visual Basic)</b>	24
	Simple programs using Basic Controls Programs for Launching Applications using OLE Objects Working with Menus, Dialog Boxes, Drag and Drop Events and ActiveX Controls Programs to Handle Databases	
2.	<b>RDBMS (Oracle)</b>	24
	Tables : Creations, Sorting, Setting relation between tables Queries using single and multiple tables Exception Handling, Cursor and Triggers Importing Tables from Electronic Spreadsheet and Text File Report from usage	
<b>Total Conduct Hours</b>		<b>48</b>
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> Model the databases using MS-ACCESS and SQL <b>CO2:</b> Write SQL queries, sub queries and aggregate functions using multiple tables <b>CO3:</b> Implement triggers, exceptions and cursors on databases using PL/SQL <b>CO4:</b> Use reporting tools to generate reports using databases <b>CO5:</b> Develop a project using VB as front-end and SQL as back-end	

#### Mapping of COs with PSOs:

<b>CO Vs PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3

<b>Course Code &amp; Title</b>	<b>18MCAP0317 LAB – VI: JAVA PROGRAMMING</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>III</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Recognize Java concepts for programming. <b>K-2:</b> Write Java programs. <b>K-3:</b> Develop simple and web-based applications using Java.			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Develop the programs using all the fundamental concepts of Java programming</li> <li>• Utilize the existing packages for efficient programming</li> <li>• Help them create their own packages and databases</li> <li>• Demonstrate the advanced programming using threads and applets</li> <li>• Explain them the data storage with different file formats</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>No. of Hours</b>
<b>I</b>	1. Control statements, arrays 2. Classes, Inheritance	10
<b>II</b>	3. Packages, Interfaces 4. Mathematical Methods	10
<b>III</b>	5. Exception handling 6. Input / Output classes	10
<b>IV</b>	7. Strings 8. Threads	10
<b>V</b>	9. Applets and Graphics 10. Applications using the above concepts	8
<b>Total Conduct Hours</b>		<b>48</b>
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b>  <b>CO1:</b> Develop programs using the fundamental concepts in Java <b>CO2:</b> Demonstrate classes, objects, principles of inheritance and Polymorphism, encapsulation, method overloading and to show thread priority, exception handling. <b>CO3:</b> Develop application using packages and store the data in the database. <b>CO4:</b> Design GUI using applets. <b>CO5:</b> Apply object oriented design for all real world problems.	

**Mapping of COs with PSOs:**

<b>CO Vs PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3

<b>18MCAP01F1</b>	<b>EXTENSION/FIELD VISIT</b>
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<b>18EXNP03V1</b>	<b>VILLAGE PLACEMENT PROGRAMME</b>	<b>Credits: 2</b>
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## SEMESTER IV

<b>Course Code &amp; Title</b>	<b>18MCAP0418 WEB PROGRAMMING</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>IV</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Recall TCP/IP protocol, IP address and Domain Name Systems <b>K-2:</b> Develop interactive web pages using relevant and recent techniques <b>K-3:</b> Use different scripting languages to design dynamic web pages <b>K-4:</b> Analyse the various web hosting services			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Provide insight into the basics of the Web Programming</li> <li>• Design and implement a dynamic web applications using HTML, JavaScript , PHP and MySQL</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Introduction to HTML &amp; CSS</b> Introduction to HTML: Headings - Linking- Internal linking - Images- Special Characters and horizontal Rules Lists- Tables- Forms- Meta elements Cascading Style sheets: Inline Styles-Embedded Style Sheets-Conflicting Styles - Linking External Style Sheets XML: Introduction -XML Basics-Structuring Data-Document Type Definitions	13
<b>II</b>	<b>Java Script, Objects &amp; Dynamic HTML</b> Java Script: Introduction to Scripting -Control Statements – Functions Objects: Math object –Array Object-String Object Document object - Boolean and Number objects -.Window object Dynamic HTML: Events-Using cookies	13
<b>III</b>	PHP Scripting Working with Files PHP Scripting: Create a Simple PHP Program -Using Variables in PHP- Operators and Expressions -Conditional and Branching Statements Loops and Arrays - HTML Form fields and PHP  Working with Files :File Modes- Reading and Writing Characters In Files - Reading Entire Files - Random Access to File - Getting Information on Files - Working with Directories - Uploading Files PHP - MySQL Database Connectivity	12
<b>IV</b>	<b>An Introduction to TCP/IP</b> An Introduction to TCP/IP: TCP/IP Basics - Addressing - Concept of IP address Resolution Protocol(ARP) -Reverse Address Resolution Protocol(RARP) -Bootstrap Protocol – DHCP– ICMP	14

<b>V</b>	Domain Name System (DNS): Introduction -Domain Name System -DNS Namespace -DNS server Email: Introduction -SMTP-POP and IMAP-MIME-FTP-TFTP-Basics of WWW and HTTP.	12
<b>Total Conduct Hours</b>		<b>64</b>
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Deitel, Internet and World Wide Web – How to Program, Fourth Edition, Pearson Prentice Hall, 2009</li> <li>2. Dave W.Mercer, Allen Kent, Steven, Beginning PHP5, Wiley – Dreamtech Publications, 2004.</li> <li>3. Achyut S Godole &amp; Atul Kahate, Web Technologies, TCP/IP Architecture and Java Programming, Second Edition, Tata Mc Graw Hill, 2010.</li> </ol>		
<b>References:</b>		
<ol style="list-style-type: none"> <li>1. Lee Chao, Database Development and Management, Auerbach Publications, 2010.</li> <li>2. Krisjamsa and Ken cope, Internet Programming, Galgotia Publications Pvt Ltd, 1995.</li> <li>3. Powell, HTML – The Complete Reference, Tata Mc Graw Hill, 1998.</li> <li>4. Ann Navarre, Chuck White, Mastering XML, BPB Publications, 2000.</li> </ol>		
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Design webpages using HTML and have practical experience in working with XML</p> <p><b>CO2:</b> Generate dynamic content to webpages using JavaScript and PHP</p> <p><b>CO3:</b> Develop online web applications with database connectivity using PHP and MySQL</p> <p><b>CO4:</b> Outline the basics of TCP/IP Protocols and IP address</p> <p><b>CO5:</b> Analyze Domain Name System and its implementation.</p>	

**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO1</b>	3	3	2	3	3
<b>CO2</b>	3	3	2	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	2	2	2
<b>CO5</b>	3	3	2	2	2



<b>Course Code &amp; Title</b>	<b>18MCAP0419 COMPUTER NETWORKS</b>		
	<b>Credits: 4</b>		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>IV</b>
<b>Cognitive Level</b>	<b>K-1:</b> Define the basic concepts and models of network <b>K-2:</b> Describe the working of various layers and protocols <b>K-3:</b> Apply and analyse the operations performed by protocols		
<b>Course Objectives</b>	<b>The Course aims to</b> Students should be able to <ul style="list-style-type: none"> <li>• List the types of Computer Networks &amp; Models</li> <li>• Describe the working of different layers</li> <li>• Explain routing and Transport layer algorithms</li> <li>• Illustrate the strengths and weaknesses of the algorithms</li> <li>• Outline the meaning and role of the protocols</li> </ul>		

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Computer Networks &amp; Models</b>	13
	Uses of computer networks - Network hardware - Network – software - Reference models - Example networks - Network standardization	
<b>II</b>	<b>Communication Media</b>	13
	Guided transmission media - Wireless transmission - Communication satellites - The public switched telephone network	
<b>III</b>	<b>Data link layer</b>	13
	Data link layer design issues - Error detection and correction - Elementary data link protocols - Sliding window protocols - Multiple access protocols	
<b>IV</b>	<b>Network Layer</b>	12
	Network layer design issues - Routing algorithms - Congestion - control algorithms - Quality of service - Internetworking	
<b>V</b>	<b>Transport Service</b>	13
	Transport service - Elements of transport protocols - Electronic mail	
<b>Total Contact Hours</b>		<b>64</b>
<b>Text Book:</b> Andrew S.Tanenbaum, Computer Networks, 4/e, Prentice – Hall of India Private Ltd., 2003.		
<b>References:</b> <ol style="list-style-type: none"> <li>1. Vijay Ahuja, Design and Analysis of Computer Communication Networks, McGraw – Hill International Ed., 1987.</li> <li>2. Fred Halsall, Data Communications, Computer Networks and Open Systems, 4/e, Addison– Wesley, 1999.</li> <li>3. James K. Hardy, Inside Networks, Prentice – Hall of India, 1999.</li> </ol>		

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO 1:</b> Explain the different types of Computer Networks and Models</p> <p><b>CO 2:</b> Differentiate the types of communication media</p> <p><b>CO 3:</b> Relate the working of Data Link &amp; Network layer</p> <p><b>CO 4:</b> Analyse the transport services and simple security algorithms</p> <p><b>CO 5:</b> Criticise the functionalities of the layers</p>
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**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	1	1	-	1
CO2	3	2	-	3	2
CO3	3	1	1	1	2
CO4	3	3	2	2	-
CO5	3	2	2	1	1

<b>18MCAP04EX</b>	<b>MAJOR ELECTIVE – II</b>		
<b>Credits</b>	<b>Theory: 4</b>	<b>Practical: 0</b>	<b>Total Credits: 4</b>

<b>18MCAP04EY</b>	<b>MAJOR ELECTIVE – III</b>		
<b>Credits</b>	<b>Theory: 4</b>	<b>Practical: 0</b>	<b>Total Credits: 4</b>

<b>18MCAP04MX</b>	<b>MODULAR COURSE - II</b>		
<b>Credits</b>	<b>Theory: 2</b>	<b>Practical: 0</b>	<b>Total Credits: 2</b>

<b>Course Code &amp; Title</b>	<b>18MCAP0420 LAB VII: WEB PROGRAMMING</b>			<b>Credit: 1</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>IV</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Practice to design web pages using HTML, CSS, XML and web services <b>K-2:</b> Develop web applications for IT applications <b>K-3:</b> Use different scripting languages to design dynamic web pages <b>K-4:</b> Host the webpages into the internet			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Explore the designing of web applications</li> <li>• Design and implement a dynamic web applications using HTML, JavaScript, PHP and MySQL</li> </ul>			

	<b>CONTENTS</b>	<b>No. of Hours</b>
<b>1</b>	Web page design using HTML Tags <ul style="list-style-type: none"> <li>• Creation – Ordered List, Unordered List, Tables, Frames, Links, Image Anchor, Image Maps</li> <li>• Using Form Controls with Input Tag, Cascading Style Sheets</li> </ul>	10
<b>2</b>	XML <ul style="list-style-type: none"> <li>• Creating XML Document with Internal DTD and External DTD</li> </ul>	10
<b>3</b>	JavaScript <ul style="list-style-type: none"> <li>• Simple Programs in JavaScript Using Control Structures, Arrays, Strings, Objects, Event Handlers, Form Validation</li> </ul>	10
<b>4</b>	PHP <ul style="list-style-type: none"> <li>• Programs on Arrays using PHP Array Functions</li> <li>• Validation of HTML Form Inputs and Processing Using Global Variables</li> <li>• Programs based on PHP and MySQL Database Connectivity</li> </ul>	10
<b>5</b>	Simple Project on Web Designing	8
<b>Total Conduct Hours</b>		<b>48</b>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Design webpages using HTML, CSS and XML</p> <p><b>CO2:</b> Write scripts using PHP and JavaScript to develop dynamic webpages</p> <p><b>CO3:</b> Develop online web applications with database connectivity using PHP and MySQL</p> <p><b>CO4:</b> Develop web application project using web designing tools and Techniques</p> <p><b>CO5:</b> Hosts the web application in the internet</p>
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**Mapping of COs with PSOs:**

<b>CO Vs PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3

Course Code & Title	<b>18MCAP0421 LAB VIII: NETWORKS</b>		
			<b>Credit: 1</b>
Class	MCA	Semester	IV
Cognitive Level	<b>K-1:</b> Define the packages, interfaces and methods <b>K-2:</b> Encode working principles of algorithms <b>K-3:</b> Apply the concepts and implement the algorithms		
Course Objectives	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>List the packages, interfaces and classes required</li> <li>Encode working principles of the existing algorithms</li> <li>Analyse the concepts and implement the algorithms</li> <li>Apply the syntaxes in the appropriate functionalities</li> <li>Write new programs based on the requirements</li> </ul>		
	CONTENTS		No. of Hours
<b>1</b>	Host Identification and Details		2
<b>2</b>	Ping and Echo Commands		2
<b>3</b>	Client/ Server Implementation		2
<b>4</b>	File Transfer		5
<b>5</b>	Framing Techniques		6
<b>6</b>	Encoding		4
<b>7</b>	Multi– Client and Server		4
<b>8</b>	Error Control		6
<b>9</b>	Routing Algorithms		8
<b>10</b>	Encryption Techniques		8
<b>Total Contact Hours</b>			<b>48</b>
Course Outcomes	<b>On completion of the course, students should be able to</b> <b>CO1:</b> List the packages, interfaces and methods <b>CO2:</b> Encode the working principles of algorithms <b>CO3:</b> Apply the concepts and implement the algorithms <b>CO4:</b> Write new programs according to the requirements <b>CO5:</b> Solve complex computational problems		

#### Mapping of COs with PSOs:

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO1</b>	3	2	2	1	2
<b>CO2</b>	3	3	-	1	2
<b>CO3</b>	3	3	-	1	3
<b>CO4</b>	3	3	-	1	2
<b>CO5</b>	3	3	-	1	2

<b>18MCAP0422</b>	<b>MINI PROJECT ON IT FOR RURAL DEVELOPMENT</b>	<b>Credits: 2</b>
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## SEMESTER V

<b>Course Code &amp; Title</b>	<b>18MCAP0523 PYTHON PROGRAMMING</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>V</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Recognize the programming constructs of python language <b>K-2:</b> Demonstrate the classes, objects, functions, files, exceptions and graphics through python programs <b>K-3:</b> Develop application using Python Programming Language <b>K-4:</b> Model Mobile application for societal problems			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Identify the programming constructs, objects and classes in Python Language</li> <li>• Develop efficient applications to solve real world problems using Python</li> </ul>			

UNIT	CONTENTS	Lecture Schedule
<b>I</b>	<b>Introduction</b> <b>Introduction:</b> IDLE an Interpreter for Python, Python Strings, Relational Operators, Logical Operators, Bitwise Operators, Variables and Assignment Statements, Keywords, Script Mode <b>Functions -</b> Built-in Functions, Function Definition and Call, Importing User-defined Module, Assert Statement, Command Line Arguments <b>Control Structures-</b> if Conditional Statement, Iteration (for and while Statements)	13
<b>II</b>	<b>Scopes, Strings and Objects</b> <b>Scope -</b> Objects and Object ids, Scope of Objects and Names <b>Strings -</b> Strings, String Processing Examples, Pattern Matching.. <b>Mutable and Immutable Objects –</b> Lists, Sets, Tuples, Dictionary	13
<b>III</b>	<b>Recursion, Files and Exceptions</b> <b>Recursion -</b> Recursive Solutions for Problems on Numeric Data, Recursive Solutions for Problems on Strings, Recursive Solutions for Problems on Lists, Problem of Tower of Hanoi <b>Files and Exceptions-</b> File Handling, Writing Structures to a File, Errors and Exceptions, Handling Exceptions Using try...except, File Processing Example	13
<b>IV</b>	<b>Classes</b> <b>Classes I -</b> Classes and Objects, Person: An Example of Class, Class as Abstract Data Type, Date Class <b>Classes II -</b> Polymorphism, Encapsulation, Data Hiding, and Data Abstraction, Modifier and Accessor Methods, Static Method, Adding Methods Dynamically, Composition, Inheritance, Built-in Functions for Classes	13

<b>V</b>	<b>Graphics and Applications of Python</b> <b>Graphics</b> - 2D Graphics, 3D Objects, Animation – Bouncing Ball <b>Applications of Python</b> - Collecting Information from Twitter, Sharing Data Using Sockets, Managing Databases Using Structured Query Language (SQL), Developing Mobile Application for Android, Integrating Java with Python, Python Chat Application Using Kivy and Socket Programming	12
<b>Total Conduct Hours</b>		<b>64</b>
<b>Text Book:</b> Sheetal Taneja, Naveen Kumar Python Programming a Modular Approach with Graphics, Database, Mobile and Web Applications — Pearson Publication, 2018.		
<b>References:</b> <ol style="list-style-type: none"> <li>1. Reema Thareja, Python Programming - Oxford University Press, 2017.</li> <li>2. Lambert, Fundamentals of Python Programming, – Cengage Publications, 2017.</li> <li>3. E. Balagurusamy, Problem Solving using Python – Mc Graw Hill Education Ltd., 2017.</li> </ol>		
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b>  <b>CO1:</b> Understand why Python is a useful scripting language for developers <b>CO2:</b> Apply decision and repetition structures in program design <b>CO3:</b> Implement methods and functions to improve readability of programs <b>CO4:</b> Develop an efficient applications using python programming <b>CO5:</b> Design and develop mobile application for societal problem.	

**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	2	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3

<b>Course Code &amp; Title</b>	<b>18MCAP0524 SOFTWARE ENGINEERING</b>		
	<b>Credits: 4</b>		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>V</b>
<b>Cognitive Level</b>	<b>K-1:</b> Define the basic concepts, Software process and project metrics <b>K-2:</b> Describe the working of project planning and risk analysis And management <b>K-3:</b> Analyse the Software Testing Techniques		
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Describe the various processes and models in software development</li> <li>• Identify the metrics and estimates of software</li> <li>• Explain Risk analysis and management</li> <li>• Categorize the Software quality assurance</li> <li>• Define the various testing techniques and strategies.</li> </ul>		

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	THE PROCESS: Software engineering: A layered technology The Software process – Software process models The linear sequential model – The prototyping model The RAD model – Evolutionary software process models Component based development – The formal methods model Fourth generation techniques – Process technology Product and process	12
<b>II</b>	SOFTWARE PROCESS AND PROJECT METRICS: Measures, metrics and indicators Metrics in the process and project domains – Software measurement Reconciling different metrics approaches – Metrics for software quality Integrating metrics within the software engineering process Managing variation: statistical quality control – Metrics for small organizations Establishing a software metrics program SOFTWARE PROJECT PLANNING: Observations on estimating Project planning objectives – Software scope Resources – Software project estimation – Decomposition techniques Empirical estimation model – Automated estimation tools	14



<b>III</b>	<p><b>RISK ANALYSIS AND MANAGEMENT:</b> Software risks  Risk identification  Risk projection  Risk refinement – Risk mitigation, monitoring and management</p> <p><b>SOFTWARE QUALITY ASSURANCE:</b> Quality concepts  The quality movement – Software quality assurance  Software reviews – Formal technical reviews  Software reliability – The ISO 9000 quality standards</p>	12
<b>IV</b>	<p><b>SYSTEM ENGINEERING:</b> Computer based systems  The system engineering hierarchy  Business process engineering: an overview  Product engineering: An overview – Requirements engineering  System modelling</p> <p><b>DESIGN CONCEPTS AND PRINCIPLES:</b> Software design and software engineering  The design process – Design principles  Design concepts – Effective modular design  Design heuristics for effective modularity  The design model – Design documentation</p>	14
<b>V</b>	<p><b>SOFTWARE TESTING TECHNIQUES:</b> Software testing fundamentals  Test case design – White-box testing – Basis path testing  Control structure testing – Black box testing  Testing for specialized Environments, Architectures and applications</p> <p><b>SOFTWARE TESTING STRATEGIES:</b> A strategic approach to software testing  Strategic issues – Unit testing  Integration testing – Validation testing  System testing – The art of debugging</p>	14
<b>Total Contact Hours</b>		<b>64</b>
<p><b>Text Book:</b></p> <p style="padding-left: 40px;">Roger S. Pressman, Software Engineering – A Practitioner’s Approach, 5/e, McGraw Hill Inc., 2001</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Alistair Cockburn, Agile Software Development, 2/e ,Pearson Education, 2007</li> <li>2. Richard E.Fairley, Software Engineering concepts, McGraw Hill, 1984.</li> <li>3. Ian Sommerville, Software Engineering, 9/e, Addison Wesley, 2011.</li> </ol>		

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Compare the various processes and models in software development  <b>CO2:</b> Discuss the metrics and estimates of software  <b>CO3:</b> Explain the Risk management and review mechanisms  <b>CO4:</b> Describe the Requirement and design engineering  <b>CO5:</b> Compare the various testing techniques and strategies.</p>
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**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	-	3
CO3	3	3	3	3	1
CO4	3	3	2	2	2
CO5	3	2	3	2	1

<b>18MCAP05EX</b>	<b>MAJOR ELECTIVE – IV</b>		
<b>Credits</b>	<b>Theory: 4</b>	<b>Practical: 0</b>	<b>Total Credits: 4</b>

<b>18MCAP05EY</b>	<b>MAJOR ELECTIVE – V</b>		
<b>Credits</b>	<b>Theory: 4</b>	<b>Practical: 0</b>	<b>Total Credits: 4</b>

<b>18MCAP05EZ</b>	<b>MAJOR ELECTIVE – VI</b>		
<b>Credits</b>	<b>Theory: 4</b>	<b>Practical: 0</b>	<b>Total Credits: 4</b>

<b>Course Code &amp; Title</b>	<b>18MCAP0525 LAB IX: PYTHON PROGRAMMING</b>			<b>Credit: 1</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>V</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Identify the programming constructs in Python programming <b>K-2:</b> Demonstrate the classes, objects, functions, files, exceptions and graphics through python programs <b>K-3:</b> Develop application using Python Programming Language <b>K-4:</b> Model Mobile application for societal problems			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>Identify the programming constructs, objects and classes in Python Language</li> <li>Develop efficient applications to solve real world problems using Python</li> </ul>			

S. No.	CONTENT	No. of Hours
	<b>Python Programs using</b>	48
1.	Control structures: if statements and iteration statements	
2.	Strings and Menus	
3.	Functions and Recursion	
4.	Classes and Objects	
5.	2D and 3D Objects	
6.	Using databases	
7.	Developing Mobile Applications	
8.	Developing Web-based applications	
<b>Total Contact Hours</b>		<b>48</b>
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> Develop programs using the fundamental concepts in Python <b>CO2:</b> Use functions and recursive functions to write effective programming <b>CO3:</b> Demonstrate classes and objects through programming <b>CO4:</b> Develop application using Databases. <b>CO5:</b> Design web-based applications to solve real world problems.	

#### Mapping of COs with PSOs:

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	2	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3

<b>Course Code &amp; Title</b>	<b>18MCAP0526 LAB – X : DOT NET PROGRAMMING</b>			<b>Credit: 1</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>V</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Discuss the packages, interfaces and methods <b>K-2:</b> Demonstrate the working principles of algorithms <b>K-3:</b> Apply the concepts and implement the algorithms			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Discuss packages, interfaces and classes required</li> <li>• Apply the working principles of the existing algorithms</li> <li>• Analyse the concepts and implement the algorithms</li> <li>• Apply the syntaxes in the appropriate functionalities</li> <li>• Write new programs based on the requirements</li> </ul>			

<b>S.No.</b>	<b>CONTENTS</b>	<b>No. of Hours</b>
1	Basics of Console Programmes	48
2	Basics of Windows Programmes	
3	Creating Windows Forms	
4	Setting and Adding Properties to a Windows Form	
5	Implementing Class Library Object, Inheritance	
6	Using Application Class and Message Class	
7	Event Handling	
8	Building graphical Interface Elements	
9	Adding Controls	
10	Common Controls, Handling Control Events and Dialog Boxes	
11	Creating Menu and Menu Items	
12	Creating Multiple – Document Interface (MDI) Applications	
13	Validation	
14	Exceptions	
15	Security	
16	Data Access with ADO .NET	
17	Data Binding	
18	Using XML Data with VB.NET	
19	Finding and Sorting Data in Datasets	
20	Creating Web Services	
<b>Total Conduct Hours</b>		<b>48</b>

<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> Recall the packages, interfaces and methods <b>CO2:</b> Explain the working principles of algorithms <b>CO3:</b> Apply the concepts and implement the algorithms <b>CO4:</b> To write new programs according to the requirements <b>CO5:</b> To solve complex computational problems
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**Mapping of COs with PSOs:**

<b>CO Vs PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	3	2	2	1	2
<b>CO2</b>	3	3	-	1	2
<b>CO3</b>	3	3	-	1	3
<b>CO4</b>	3	3	-	1	2
<b>CO5</b>	3	3	-	1	2

<b>18MCAP0527</b>	<b>MINI PROJECT (MOBILE APPLICATIONS DEVELOPMENT)</b>	<b>Credits: 2</b>
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**SEMESTER VI**

<b>18MCAP0528</b>	<b>DISSERTATION AND VIVA-VOCE</b>	<b>Credits: 14</b>
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## ELECTIVES

<b>Course Code &amp; Title</b>	<b>18MCA03E1 OPTIMIZATION TECHNIQUES</b> (Derivation of results and proofs of theorems are not expected) <b>Credits: 4</b>		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>IV</b>
<b>Cognitive Level</b>	<p><b>K-1:</b> Know about the concepts of Mathematical Formulation of LPP, General LPP, Duality in LPP, Queuing system, Inventory theory, Replacement of items, Basic components of networks.</p> <p><b>K-2:</b> Understand the methods of Graphical solutions, Simplex, Big-M, Two phase, Duality and simplex, Dual Simplex, TP, Queue models, EOQ problems, CPM, PERT.</p> <p><b>K-3:</b> Apply the suitable methods to solve LPP and TP problems to get optimal solutions. Apply the suitable queue model to solve queuing problems. Apply the methods of CPM &amp; PERT to get critical path and minimum time of completion of a project.</p> <p><b>K-4:</b> Analyse the mathematical formulation to give optimal value of an LPP &amp; TP. Analyse queuing model to find traffic intensity, expected number of customers in the queue, system, expected time spent by customers etc. Analyse the inventory problems to get EOQ and minimum inventory cost. Analyse the network problems to give estimated and expected values to the successful completion of a network project.</p>		
<b>Course Objectives</b>	<p><b>The Course aims to</b></p> <ul style="list-style-type: none"> <li>• Study the mathematical formulation of LPP</li> <li>• Study the methods of solving LPP, TP, Queuing problems, Inventory problems, Replacement problems, Network problems.</li> </ul>		

UNIT	CONTENTS	Lecture Schedule
<b>I</b>	<b>Introduction</b>	14
	Mathematical Formulation of the LPP - Graphical Solutions - General LPP, Simplex Method - Big M Method, Phase I and Phase II Simplex Method	
<b>II</b>	<b>Concept of Duality in L.P.P</b>	13
	Duality in L.P.P - Duality and Simplex Method – Dual Simplex Method - Transportation Problems IBFS by NWC and VAM - Optimal Solution of TP	
<b>III</b>	<b>Queuing System</b>	13
	Queuing System - Queues Models - (M/M/1) : ( $\infty$ /FIFO) - (M/M/1) : (N/FIFO) - (M/M/C) : ( $\infty$ /FIFO), (M/M/C) : (N/FIFO) models	

IV	<b>Inventory theory</b>	12
	Inventory theory - EOQ Problems with no shortages – with shortages Replacement of Items that Deteriorate - Replacement of Items that Fail Suddenly	
V	<b>PERT and CPM</b>	12
	Network and Basic Components - CPM Calculations - PERT Calculations - Advantages of Network	
<b>Total Contact Hours</b>		<b>64</b>

**Text Book:**

Kanti Swarup, P.K. Gupta & Manmohan, Operations Research, 8/e, S. Chand & Co., New Delhi, 2010.

**References:**

1. F. Hiller and G. J. Lieberman, Introduction to Operations Research, Holden Day Inc., 1980.
2. M.A. Taha, Operations Research: An Introduction, McMillan Publ. Co, 1982.
3. L.R. Shaffer J.B. Filtter and W.L.Meyer, The Critical Path Method, McGraw Hill, 1965.

<b>Course Outcomes</b>	<p><b>On successful completion of the course, the students will be able to</b></p> <p><b>CO1:</b> Becoming a mathematical of the verbal formulation of an optimization problem</p> <p><b>CO2:</b> Feasibility study for solving an optimization problem</p> <p><b>CO3:</b> Discovery, study and solve optimization problems</p> <p><b>CO4:</b> Understand optimization techniques using algorithms</p> <p><b>CO5:</b> Investigate, study, develop, organize and promote innovative solutions for various applications</p>
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**Mapping of COs with PSOs:**

CO Vs PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	3	2	3
CO2	1	3	3	2	3
CO3	2	2	3	2	3
CO4	3	2	3	2	3
CO5	2	3	3	2	3

<b>Course Code &amp; Title</b>	<b>18MCAP04E1 IMAGE PROCESSING</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>IV</b>	
<b>Cognitive Level</b>	<b>K-2:</b> Understand the fundamentals of Image Process and its Application <b>K-3:</b> Apply the learning in solving problems in Image Process <b>K-4:</b> Evaluate the merit and demerits of Image Processing Techniques.			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Teach the concepts of image processing with suitable illustrations</li> <li>• Describe the applications of Image processing concepts and algorithms</li> <li>• Motivate the students to learn the research prospects of image processing</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Introduction and Digital Image Fundamentals</b>	14
	<b>Introduction</b> - What is Digital Image Processing- examples of fields that uses DIP - Fundamental Steps in Digital Image Processing - Components of an Image Processing - <b>Digital Image Fundamentals</b> - Elements of Visual Perception - Light and the Electromagnetic Spectrum - Image Sensing and Acquisition - Image Sampling and Quantization - Some Basic Relationships Between Pixels - Introduction to the Basic Mathematical Tools Used in Digital Image Processing.	
<b>II</b>	<b>Image Enhancement Techniques</b>	13
	Background - Some Basic Intensity Transformation Functions - Histogram Processing - Fundamentals of Spatial Filtering - Smoothing Spatial Filters - Sharpening Spatial Filters - Combining Spatial Enhancement Methods - Using Fuzzy Techniques for Intensity Transformations and Spatial Filtering.	
<b>III</b>	<b>Image Restoration and Reconstruction</b>	13
	Model of the Image Degradation/Restoration process - Noise Models - Noise Only—Spatial Filtering - Periodic Noise Reduction Using FDF - Inverse Filtering - Minimum Mean Square Error Filtering - Constrained Least Squares Filtering - Geometric Mean Filter - Image Reconstruction from Projections.	



IV	<b>Image Compression and Watermarking</b>	12
	Fundamentals - Huffman Coding - Arithmetic Coding - LZW Coding - Run-length Coding - Symbol-based Coding - Bit-plane Coding - Block Transform Coding - Predictive Coding - Digital Image Watermarking.	
V	<b>Image Segmentation and Representation</b>	12
	<b>Morphological Image Processing</b> - Preliminaries - Erosion and Dilation - Some Basic Morphological Algorithms - Morphological Reconstruction - <b>Image Segmentation</b> - Fundamentals - Point, Line, and Edge Detection - Thresholding - Segmentation by Region Growing and by Region Splitting and Merging.	
<b>Total Conduct Hours</b>		<b>64</b>
<p><b>Text Book:</b> Rafel C. Gonzalez and Richard E. Woods, Digital Image Processing, Fourth Edition, Pearson Education, 2018.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Chris Solomon &amp; Toby Breckon, Fundamentals of Digital Image Processing, Wiley – Blackwell publications, 2011.</li> <li>2. B. Chandra and D. Dutta Majumder, Digital Image Processing and Analysis, PHI, New Delhi, 2006.</li> <li>3. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall of India, 1989.</li> <li>4. <a href="http://nptel.ac.in/courses/106105032/">http://nptel.ac.in/courses/106105032/</a></li> <li>5. <a href="https://freevideolectures.com/course/2316/digital-image-processing-iit-kharagpur">https://freevideolectures.com/course/2316/digital-image-processing-iit-kharagpur</a></li> </ol>		
<b>Course Outcomes</b>	<p><b>On successful completion of the course, the students will be able to</b></p> <p><b>CO1:</b> Elucidate the fundamental concepts of a digital image processing system.</p> <p><b>CO2:</b> Analyze the types and importance of image transformations.</p> <p><b>CO3:</b> Describe image enhancement and image restoration techniques</p> <p><b>CO4:</b> Compare the performance of the image compression techniques and Image compression standards.</p> <p><b>CO5:</b> Explain the image segmentation and image representation techniques.</p> <p><b>CO6:</b> Appreciate the applications of digital image processing</p>	

### Mapping of COs with PSOs:

CO Vs PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	2	2
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
CO6	3	3	3	3	3

<b>Course Code &amp; Title</b>	<b>18MCAP04E4 COMPUTER GRAPHICS</b>		
	<b>Credits: 4</b>		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>IV</b>
<b>Cognitive Level</b>	<b>K-1:</b> Explain the core concepts of Computer Graphics <b>K-2:</b> Apply Graphics programming techniques to design and create computer graphics scenes <b>K-3:</b> Generate computer imagery application on their own		
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Explain about the creation and manipulation of images with the aid of computers and its available hardware and software.</li> <li>• Demonstrate the creation and use of graphics functions in developing solutions to graphics oriented applications.</li> </ul>		

UNIT	CONTENTS	Lecture Schedule
I	Overview Of Graphics Systems - Video Display Devices - Raster Scan And Random Scan Systems - Input Devices - GUI and Interactive Input Methods: Logical Classification of Input Devices - Input Functions	13
II	<b>Output Primitives:</b> Points and Lines – Line Drawing Algorithms – DDA and Bresenham’s - Loading the Frame Buffer – Line Function – Circle Generating Algorithms - Filled Area Primitives – Fill Area Functions – Cell ArrayCharacter Generation.	13
III	<b>Attributes of Output Primitives :</b> Line Attributes Curve Attributes- Colour and Gray Scale Area Fill Attributes – Character Attributes Bundled Attributes – Inquiry Functions–Antialiasing	12
IV	<b>Two Dimensional Geometric Transformations:</b> Basic Transformations – Matrix Representation Composite Transformations – General Fixed Point – Scaling – Other Transformations <b>Two Dimensional Viewing :</b> The Viewing Pipeline – Window– To– Viewport - Coordinate Transformation Clipping Operations – Point Clipping – Line Clipping – Cohen – Sutherland Line Clipping Sutherland – Hodge-man Polygon Clipping – Curve Clipping – Text Clipping	13
V	<b>Three Dimensional Concepts:</b> Three Dimensional Methods – Three DimensionalGeometric and Modelling Transformations .Translation – Rotation – Scaling – Other Transformations .Visible – Surface Detection Methods – Classification – Depth Buffer Method Scan Line Method – Depth Sorting Method BSP Tree Method – Area Subdivision Method.	13
<b>Total Conduct Hours</b>		<b>64</b>

**Text Book:**

Donald Hearn, M. Pauline Baker, Computer Graphics C Version, 2/e, Pearson Education, New Delhi, 2005

**References:**

1. W.M.Newman and R.F.Sprull, Principles of Interactive Computer Graphics, 2/e, Tata McGraw– Hill Publishing Co. Ltd, 1997.
2. D.F.Rogers Procedural Elements for Computer Graphics, , 2/e, Tata McGraw– Hill Publishing Co. Ltd., 2001.
3. V. Xiang and R.A. Plastock, Computer Graphics, Schaum’s Outline Series, Tata McGraw– Hill Publishing Co., 2002

**Course Outcomes**

**On successful completion of the course, the students will be able to**

- CO1:** Identify the types of graphics monitors, workstations, input devices and input techniques available to work with graphics.
- CO2:** Apply the mathematical and heuristic algorithms behind the Graphics object generation.
- CO3:** Select the attributes to control the object shape and antialiasing techniques for accurate display.
- CO4:** Demonstrate the forms of 2D transformations, mapping process from world view to display view and clipping process.
- CO5:** Design the algorithms for 3D objects.

**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	2	2
CO2	3	3	3	3	3
CO3	2	2	2	2	3
CO4	3	2	2	2	2
CO5	3	2	3	2	3

<b>Course Code &amp; Title</b>	<b>18MCAP05E1 INFORMATION SECURITY</b> Credits: 4		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>IV</b>
<b>Cognitive Level</b>	<b>K-1:</b> Define the basics of information security(40) <b>K-2:</b> Identify and analyse the risks and their management (40) <b>K-3:</b> Analyse the impacts and evaluate them (20)		
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Define the basics of Information Security</li> <li>• Identify Risk and Management of Risks</li> <li>• Recognise various standards in Security</li> <li>• Analyse the nature of risk</li> <li>• Examine the type of risk</li> </ul>		

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Introduction</b>	13
	Introduction: History, What is Information Security? - Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Balancing Security and Access - The SDLC, The Security SDLC	
<b>II</b>	<b>Security Investigation</b>	12
	Security Investigation: Need for Security - Business Needs – Threats – Attacks - Secure Software Development - Laws and Ethics in Information security - Ethics in Information security	
<b>III</b>	<b>Security Analysis</b>	13
	Risk Management: Identifying and Assessing Risk - Controlling Risk - Quantitative versus Qualitative Risk control practices - Risk management discussion points	
<b>IV</b>	<b>Logical Design</b>	13
	Information security planning and Governance - Information Security Policy - Standards and Practices - The Information Security Blueprint - Security Education, Training and Awareness program - Continuity Strategies	
<b>V</b>	<b>Physical Design</b>	13
	Intrusion Detection and Prevention Systems - Scanning and Analysis Tools - Cipher Methods -Cryptographic Algorithms - Cryptographic Tools - Attacks on Cryptosystems - Physical Access Controls	
<b>Total contact Hours</b>		<b>64</b>

<b>Text Book:</b>	
Michael E Whitman and Herbert J Mattord, Principles of Information Security, Vikas Publishing House, New Delhi, 2003	
<b>References:</b>	
1. Micki Krause, Harold F. Tipton, Handbook of Information Security Management, Vol 1– 3 CRC Press LLC, 2004.	
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, Hacking Exposed, Tata McGraw– Hill, 2003.	
3. Matt Bishop, Computer Security Art and Science, Pearson/Prentice Hall of India, 2002.	
<b>Course Outcomes</b>	<b>On successful completion of the course, the students will be able to</b>
	<b>CO1:</b> Explain the basics of Information Security <b>CO2:</b> Describe various Security Threats and Attacks <b>CO3:</b> Analyse Risk Management <b>CO4:</b> Define various standards in Security <b>CO5:</b> Explain technological aspects of Information Security

**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO1</b>	3	1	1	1	3
<b>CO2</b>	3	1	3	1	3
<b>CO3</b>	2	3	1	1	3
<b>CO4</b>	3	2	2	1	2
<b>CO5</b>	3	2	1	1	2

<b>Course Code &amp; Title</b>	<b>18MCAP05E2 MOBILE COMMUNICATIONS</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>V</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Describe the terms and technologies used for mobile communications <b>K-2:</b> Illustrate the network model for mobile communications. <b>K-3:</b> Analyse the communication strategies used for wireless networks.			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Discuss the importance of mobile devices and merits of its communication strategies in present scenario.</li> <li>• Prepare the students to develop smart phone applications for mobile communications.</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	Introduction: Need for Mobile Computing, Mobile and Wireless Devices, Simplified Reference Model. Wireless Transmission: Frequencies, Signals, Antennas, Signal propagation, Multiplexing, Spread Spectrum and Cellular Systems. Medium Access Control: SDMA, FDMA, TDMA, CDMA, Comparisons.	13
<b>II</b>	Telecommunication System: GSM – Services, Architecture, Interface, Protocols, Localization, Calling, Handover and Security, UMTS and IMT 2000 – Standardization, Architecture, Interface, Network, Handover. Satellite System: History, Applications, Basics, Routing, Localization, Handover.	13
<b>III</b>	Wireless Lan : IEEE 802.11 – Architecture, Physical Layer, MAC Layer, HIPERLAN 1, Bluetooth – Architecture, Link Management and Security.	13
<b>IV</b>	Mobile Network Layer: Mobile IP – Goals, Packet Delivery Strategies, Registration, Tunneling and Reverse Tunneling, Mobile Ad-hoc Networks, Routing Strategies.	13
<b>V</b>	Wireless Application Protocol: Architecture, Protocols, WML, WML Script Applications.	12
<b>Total Conduct Hours</b>		<b>64</b>
<b>Text Books:</b>		
1. Jochen Schiller, Mobile Communication, 2/e, Pearson Education, Delhi 2008. 2. Singhal Sandeep and Bridgm Thomas, The Wireless Application Protocol – Pearson Education, India, 2001.		
<b>References:</b>		
Wireless Application Protocol: “Writing Applications for the Mobile internet”, Sandeep Signal et al.		

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> To identify the types of mobile and wireless devices available and their features. To understand the role of antenna, cellular systems and types of medium access controls.</p> <p><b>CO2:</b> To analyse the different types of telecommunication systems and their role into mobile and wireless communication networks. Primarily focuses the roaming and handover procedures adopted by different systems.</p> <p><b>CO3:</b> To identify the types of wireless LAN architecture and protocols.</p> <p><b>CO4:</b> To discuss the structure, features and transmission techniques of mobile IP.</p> <p><b>CO5:</b> To learn the coding using WML script, an up gradation of HTML and XML for mobile applications .</p>
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**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	2	2
CO2	3	3	3	2	2
CO3	3	3	3	2	2
CO4	3	3	3	2	2
CO5	3	3	3	3	3

<b>Course Code &amp; Title</b>	<b>18MCAP05E4 ORGANIZATIONAL BEHAVIOUR</b>		
			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>IV</b>
<b>Cognitive Level</b>	<p><b>K-1:</b> Remember the key terms, models and structures in Organization.</p> <p><b>K-2:</b> Discuss the behaviours, leadership styles and work culture in an organization.</p> <p><b>K-3:</b> Analyse and evaluate the performance and improve the quality and productivity.</p>		
<b>Course Objectives</b>	<p><b>The Course aims to</b></p> <ul style="list-style-type: none"> <li>• Help students express organizational behaviour</li> <li>• Also help recognise the management practices</li> <li>• Provide ability to examine psychological principles</li> <li>• Facilitate a critical evaluation of organizational practices</li> <li>• Analyse the impact of work behaviours, attitudes and performance</li> </ul>		

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Importance of Organizational Behaviour</b>	12
	Definition-Contributing Fields to Organizational Behaviour- Behaviour model for organizational efficiency - Organizational Components that need to be managed- Foundation of Individual Behaviour – Biographical Characteristics - Framework of Emotional Competence - Learned Characteristics-Developing an Organizational Behaviour model (OB Model) - Types of models of Organizational. Behaviour model-Environmental Factors	
<b>II</b>	<b>Factors Influencing Personality</b>	12
	Determinants of Personality-Personality Traits - The Myers-Briggs Type Indicator(MBTI)-Locus of control - Personality orientation-Achievement orientation-Authoritarianism - Theory of Machiavellianism-Self-Esteem-Self Monitoring-Risk Taking - Types of personality-Studies indicating personality traits of Indian Managers	
<b>III</b>	<b>Organization Structure</b>	14
	Definition-Forms of Organization Structure-Organic form of Organizational structure - Bureaucracy-Concepts of Organizational structure-Centralization and decentralization-Formalization-Standardization-Specialization-Stratification-Formal Organization - Informal Organization -Span of Management - Designing of Organizational Structure -Types of Organizational Structure	



IV	<b>Leadership Styles</b>	12
	Introduction-Ingredients of Leadership- Theories of Leadership Trait Theory of Leadership - Leadership styles based on authority- Managerial Grid - Contingency approach to leadership-Hersey and Blanchard's situational leadership model- Behavioral approach - Fiedler's contingency approach-Path-Goal theory of leadership-charismatic leadership-Transformational leadership	
V	<b>Organizational Development and Culture</b>	14
	Quality of work life- Sensitivity Training- Transactional Analysis - Process Consultation- Third party peacemaking interventions - Individual counseling- career planning-Job Related Interventions- Socio-Technical Interventions- Structural Interventions-Learning Organization - Functions of Organizational Culture- Levels of Culture - Management Philosophy-Organizational Climate	
<b>Total Contact Hours</b>		<b>64</b>
<p><b>Text Books:</b></p> <ol style="list-style-type: none"> <li>1. V G Kondalkar, Organizational Behaviour, New Age Publishing House, First Edition, 2018.</li> <li>2. Stephen P. Robins, Organisational Behaviour, 11/e, PHI Learning / Pearson Education, 2008.</li> <li>3. Fred Luthans, Organisational Behaviour, 11/e, McGraw Hill, 2001.</li> </ol> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Schermerhorn, Hunt and Osborn, Organisational Behaviour, 9/e, John Wiley, 2008.</li> <li>2. Udai Pareek, Understanding Organisational Behaviour, 2/e, Oxford Higher Education, 2004.</li> <li>3. Mc Shane &amp; Von Glinov, Organisational Behaviour, 4/e, Tata Mc Graw Hill, 2007.</li> </ol>		
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b>	
	<p><b>CO1:</b> Evaluate the importance of Organizational Behaviour (OB) and various OB models</p> <p><b>CO2:</b> Identify the factors that influence a person's personality and their impact on work behaviour</p> <p><b>CO3:</b> Explain the organization structure and Group Dynamics</p> <p><b>CO4:</b> Evaluate the potential effectiveness of leadership styles within a Specific organizational context</p> <p><b>CO5:</b> Assess complexity and uncertainty in organizations and apply Organizational behaviour concepts to managing behaviours in the workplace.</p>	

**Mapping of COs with PSOs:**

<b>CO Vs PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	-	2	2	1	2
<b>CO2</b>	-	3	-	2	2
<b>CO3</b>	-	3	-	1	3
<b>CO4</b>	-	3	-	2	2
<b>CO5</b>	-	3	-	1	3

<b>Course Code &amp; Title</b>	<b>18MCAP05E7 DATA MINING</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>V</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Recall the basic concepts and architecture of data warehousing <b>K-2:</b> Define the working of various classification and Cluster analysis <b>K-3:</b> Apply basic algorithms and techniques used in data mining			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Evaluate the concepts of database technology for data mining and its applications</li> <li>• Define the basic concepts of Data Warehousing and its Architecture</li> <li>• Describe the Mining multimedia databases with text mining and web usage mining</li> <li>• Categorize the major methods used in Data mining and warehousing.</li> <li>• Apply the basic algorithms and techniques used in data mining</li> </ul>			

UNIT	CONTENTS	Lecture Schedule
<b>I</b>	<b>Introduction</b>	12
	<b>Introduction:</b> What is Data Mining-On What Kind of Data-Data Mining functionalities-Classification of Data Mining Systems Integration of a Data Mining System with a Database or Data Warehouse system-Major issues in data mining.	
<b>II</b>	<b>Data Warehouse and OLAP Technology for Data Mining</b>	14
	Data Warehouse and OLAP Technology for Data Mining: What is a Data Warehouse? -Multidimensional data model -Data Warehouse Architecture. Association Rule Mining: The Apriori Algorithm-Generating association Rules from Frequent Itemsets -Improving the efficiency of Apriori-Mining Frequent Itemsets without Candidate Generation	
<b>III</b>	<b>Classification and Prediction</b>	12
	Classification and Prediction: What is Classification? -What is Prediction?-Comparing Classification and Prediction Methods Classification: Decision Tree Induction-Attribute Selection Measures Prediction: Linear regression -Non-Linear Regression	

IV	<b>Cluster Analysis</b>	13
	Cluster Analysis: What is Cluster Analysis? -Types of Data in Cluster Analysis A Categorization of Major Clustering Methods: Partitioning Methods: K-means, CLARA, CLARANS, K-Medoids. Hierarchical Methods: BIRCH, ROCK Density based Methods :DBSCAN Grid based Method : STING	
V	<b>Mining Multimedia Databases</b>	13
	Mining Multimedia Databases: Similarity Search in Multimedia Data, Sequential Pattern Mining Text mining: Keyword-Based Association and Document Classification Mining the Worldwide Web: Mining the Web's Link Structures to Identify Authoritative Web Pages -Web Usage Mining	
<b>Total Contact Hours</b>		<b>64</b>
<b>Text Book:</b> Jiawei Han, Micheline Kamber, Data Mining Concepts and Techniques, 2/e, Morgan Kaufman Publisher(Elsevier), 2006.		
<b>References:</b> 1. Arun K Pujari, Data Mining Techniques, Universities Press (India) Private Limited, 2001. 2. K.P. Soman, Shyam Diwakar, V.Ajay, Insight into Data Mining Theory and Practice, Prentice Hall of India Pvt. Ltd – New Delhi, 2006.		
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b>  <b>CO1:</b> Compare and contrast Data Mining and Traditional DBMS and major issues in Data mining <b>CO2:</b> Discuss the Data Warehouse architecture and apply On-line Analytical Processing (OLAP) operations for manipulations. <b>CO3:</b> Illustrate the use of decision tree induction algorithm for mining classification rules and methods used for Prediction. <b>CO4:</b> Explain the various clustering methods used in Cluster Analysis <b>CO5:</b> Describe the various applications and current research areas in data mining.	

**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	3	2	1	2
CO2	2	2	3	-	3
CO3	-	-	1	3	1
CO4	1	-	-	2	-
CO5	1	2	3	2	1

<b>Course Code &amp; Title</b>	<b>18MCAP05E8 ARTIFICIAL INTELLIGENCE AND DEEP LEARNING</b>			<b>Credits: 4</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>V</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Define the basic concepts of Artificial Intelligence. <b>K-2:</b> Solve problems using Artificial Intelligence. <b>K-3:</b> Develop Deep Neural Network model for a specific application.			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Explain the basic concepts of Artificial Intelligence.</li> <li>• Demonstrate the methods of solving problems using Artificial Intelligence.</li> <li>• Outline the basic issues of knowledge representation and Inference that plays an important role in AI programs.</li> <li>• Describe the basics of Deep Learning and its applications such as Natural language processing, Robotics, Expert systems etc.</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>ARTIFICIAL INTELLIGENCE</b> Introduction to AI- Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breadth first, Constraints satisfaction Related algorithms, Measure of performance and analysis of search algorithms.	13
<b>II</b>	<b>REPRESENTATION OF KNOWLEDGE</b> Game playing - Knowledge representation, Knowledge representation using Predicate logic Introduction to predicate calculus, Resolution, Use of predicate calculus Knowledge representation using other logic-Structured representation of knowledge	13
<b>III</b>	<b>KNOWLEDGE INFERENCE:</b> Knowledge representation -Production based system, Frame based system Inference - Backward chaining, Forward chaining, Rule value approach Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.	12
<b>IV</b>	<b>BASICS OF DEEP LEARNING:</b> Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic Linear Perception, Perception Learning Algorithm, Linear separability. Convergence theorem for Perception Learning Algorithm.	14

V	<b>FEED FORWARD NETWORKS:</b> Multilayer Perception, Gradient Descent, Back propagation, Empirical Risk Minimization, regularization, auto encoders Deep Neural Networks: Difficulty of training deep neural networks, Greedy layer wise training.	12
<b>Total Conduct Hours</b>		<b>64</b>
<b>Text Books:</b> <ol style="list-style-type: none"> <li>Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, McGraw Hill, 2008 (Units- I,II)</li> <li>Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III). Ian Goodfellow, Yoshua Bengio and Aaron Courville, “Deep Learning”, MIT Press, 2016.(Units IV &amp; V)</li> </ol>		
<b>References:</b> <ol style="list-style-type: none"> <li>Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007.</li> <li>Deepak Khemani “Artificial Intelligence”, Tata Mc Graw Hill Education 2013.</li> <li>Raúl Rojas, "Neural Networks: A Systematic Introduction", Springer, 1996.</li> <li>Christopher Bishop, "Pattern Recognition and Machine Learning", Springer, 2006</li> </ol>		
<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b>  <b>CO1:</b> Demonstrate the methods of Artificial Intelligence. <b>CO2:</b> Categorize the types of knowledge representation. <b>CO3:</b> Apply the types of knowledge inference techniques. <b>CO4:</b> Choose and apply appropriate deep learning technique for finding solutions of learning problems <b>CO5:</b> Design and develop Deep Neural Network for a specific application.	

**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	2	2
CO2	2	3	2	2	2
CO3	2	3	2	2	2
CO4	3	3	3	3	3
CO5	3	3	3	3	3

## MODULAR COURSES

<b>Course Code &amp; Title</b>	<b>18MCAP03M1 ADVANCED COMPUTING TECHNOLOGIES FOR RURAL APPLICATIONS</b>		
	<b>Credits: 2</b>		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>III</b>
<b>Cognitive Level</b>	<b>K-1:</b> Identify the key technological solutions <b>K-2:</b> Understand the pros and cons of the technologies and their applications <b>K-3:</b> Analyse and apply the appropriate technology based on the requirements		
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Describe the Advanced Computing Technologies.</li> <li>• Illustrate the different types of Informatics and their rural applications.</li> <li>• Summarise functionalities of different technologies.</li> <li>• Appraise the features of the technologies.</li> <li>• Compare different types of technologies based on requirements.</li> </ul>		

UNIT	CONTENTS	Lecture Schedule
<b>I</b>	<b>Grid Computing</b>	8
	Introduction to Grid Computing, Anatomy and Physiology of Grid Early Grid Activities - Current Grid Activities - Grid Standards - Grid Challenges and Application area - Grid Computing Organization, roles	
<b>II</b>	<b>Cloud Computing</b>	8
	Cloud Computing Overview, History, Key Terms and Definitions - Applications, Intranets and the Cloud - Cloud Today, Cloud Computing Services - On Demand Computing, Discovering Cloud Services - Software engineering fundamentals for Cloud Computing Development Services and Tools	
<b>III</b>	<b>Ubiquitous Computing</b> Ubiquitous Computing: Introduction – Basics - Applications and Requirements - Smart Devices and Services - Smart Mobiles - Cards and Device Networks	8
<b>IV</b>	<b>Informatics and Rural Applications</b>	8
	Informatics and Rural Applications: Informatics: Health - Agriculture Education – Governance - Finance and other services Rural applications	
<b>Total Contact Hours</b>		<b>32</b>

<b>Text Books:</b>	
<ol style="list-style-type: none"> <li>1. Joshy Joseph, Craig Fellenstein, Grid Computing, IBM Press, Pearson Education, 2004.</li> <li>2. Michael Miller, Cloud Computing: Web based Applications that change the way you work and Collaborate Online, Que Publishing, 2008.</li> <li>3. John Krumm, Ubiquitous Computing Fundamentals, CRC Press, 2010</li> </ol>	
<b>References:</b>	
<ol style="list-style-type: none"> <li>1. Zacharoula Andreopoulou , Basil Manos, Nico Polmanand Davide Viaggi, Agricultural and Environmental Informatics, Governance and Management: Emerging Research Applications,. IGI GLOBAL, June 2011</li> <li>2. Robert E. Hoyt , Ann K. Yoshihashi, Health Informatics: Practical Guide for Healthcare and Information Technology Professionals, lulu.com, Feb 2014</li> </ol>	
<b>Course Outcomes</b>	<p><b>The students should be able to</b></p> <p><b>CO1:</b> Explain the basic concepts of Grid Computing.</p> <p><b>CO2:</b> Implement and apply Cloud Computing.</p> <p><b>CO3:</b> Describe Ubiquitous Computing.</p> <p><b>CO4:</b> Explore how ICT can support and improve the management of Health care, Education Agriculture, Public Governance and Rural decision-making.</p> <p><b>CO5:</b> Examine the features of various technologies based on requirements.</p>

**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO1</b>	3	2	1	3	1
<b>CO2</b>	3	3	1	3	1
<b>CO3</b>	3	2	1	3	2
<b>CO4</b>	-	3	1	3	2
<b>CO5</b>	3	2	1	3	2



<b>Course Code &amp; Title</b>	<b>18MCAP03M2 COMPUTER ANIMATION</b>		
	<b>Credits: 2</b>		
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>III</b>
<b>Cognitive Level</b>	<p><b>K-1:</b> Identify the key technological solutions for creating animations</p> <p><b>K-2:</b> Analyse and apply the appropriate technology based on the requirements</p> <p><b>K-3:</b> Create animation movies and evaluate them</p>		
<b>Course Objectives</b>	<p><b>The Course aims to</b></p> <ul style="list-style-type: none"> <li>• Train the students on Computer Animation Techniques</li> <li>• Develop a skill on creating different types of animations.</li> <li>• Summarise functionalities of different technologies.</li> <li>• Appraise the features of the animation technologies.</li> <li>• Compare different types of technologies in animation</li> </ul>		

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<p><b>Animation</b>  Basics of Animation — Need for Animation -Uses of Animation  Types of Animation  Principles of Animation – Some Techniques of Animation –Animation on the WEB – 3D Animation – Special Effects Introduction to Creating Animation.</p>	7
<b>II</b>	<p><b>Creating Animation in Flash and Action script Fundamentals</b>  Introduction to Flash Animation  Working with the Timeline and Frame-based Animation Working with the Timeline and Tween-based Animation Understanding Layers  Action script Fundamentals :Declaring variables –Data type and its conversion- Operators and expressions  Statements: Types of statements-Syntax-Blocks  Conditional statements – Loop statements- Functions</p>	9
<b>III</b>	<p><b>Events and Event Handling</b>  Types of events –Event handling techniques  Event handler properties Listener Events-on() and onClip Event() handlers-Introduction of objects and classes  Movie Clips: Types of Movie Clips- Creating Movie Clips.</p>	8
<b>IV</b>	<p><b>3D Animation</b>  3D Animation &amp; its Concepts – Types of 3D Animation Skeleton &amp; Kinetic 3D Animation  Texturing &amp; Lighting of 3D Animation 3D Camera Tracking  Applications &amp; Software of 3D Animation.</p>	8
<b>Total Conduct Hours</b>		<b>32</b>

**Text Books:**

1. Ranjan Parekh, Principles of Multimedia, 2007, TMH.
2. Ashok Banerji, Multimedia Technologies –Ananda Mohan Ghosh McGraw Hill Publication.2011.
3. Colin Mooock, Action Script for Flash MX, O’Reilly Publications, Second Edition 2001.

**References:**

1. Faber & Faber, The Animator’s Survival Kit by Richard Williams Expanded Edition (ISBN – 10:0571238343 ISBN – 13: 978-0571238347)
2. Walter Foster, Cartoon Animation by Preston Blair (ISBN 1-56010-084-2)

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Create aesthetically appealing computer generated animation</p> <p><b>CO2:</b> Describe characteristics of well-designed and executed animation</p> <p><b>CO3:</b> Assess and critique past and current animation trends</p> <p><b>CO4:</b> Demonstrate progress in basic drawing and animation skills</p> <p><b>CO5:</b> Critically analyze your creative work and the work of others</p>
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**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO1</b>	3	3	2	2	2
<b>CO2</b>	3	-	-	2	1
<b>CO3</b>	3	2	3	3	1
<b>CO4</b>	3	2	3	2	2
<b>CO5</b>	3	3	3	2	2

<b>Course Code &amp; Title</b>	<b>18MCAP04M1 CYBER SECURITY AND IT ACT</b>			<b>Credits: 2</b>
<b>Class</b>	<b>MCA</b>	<b>Semester</b>	<b>V</b>	
<b>Cognitive Level</b>	<b>K-1:</b> Define the terminologies in cyber security and IT Act <b>K-2:</b> Describe the activities in cyber world and forensics <b>K-3:</b> Analyse the impact of cyber attacks			
<b>Course Objectives</b>	<b>The Course aims to</b> <ul style="list-style-type: none"> <li>• Define the different types attacks against computers networks</li> <li>• Recognise Computer and Network Forensic</li> <li>• Describe IT Act against cyber crimes</li> <li>• Predict the nature of cyber attacks</li> <li>• Differentiate an attack from another</li> </ul>			

<b>UNIT</b>	<b>CONTENTS</b>	<b>Lecture Schedule</b>
<b>I</b>	<b>Network Security</b> Network Security: Concepts-Applications-Goals- Network security Technology: Perimeter Technology- Monitoring Technology-Encryption Technology	8
<b>II</b>	<b>Cyber Security and Hackers</b> cyber crime: Reasons, Methods ,Prevention, Investigation, Agencies for Investigation- Hackers- Cyber security fundamentals-Cyber security Architecture principles- Cyber Law- Cyber security policy-Strategies for cyber security	8
<b>III</b>	<b>Computer and Network Forensic</b> Computer Security-Introduction-Computer Forensics: Introduction- History of Computer Forensics, Elements, and Investigative procedures, Analysis of Evidence- Network Forensics: Intrusion Analysis, Damage Assessment, and Forensics Tools	8
<b>IV</b>	<b>Act</b> Evolution of the IT Act- Salient features of the IT Act 2000- IPR: Intellectual Property Rights- Different Acts- IT Act in India-Amendments in IT Act-Offence and Penalty	8
<b>Total Conduct Hours</b>		<b>32</b>

<b>Text Books:</b>	
<ol style="list-style-type: none"> <li>1. Eric Maiwald , Network Security,3<sup>rd</sup> Edition, TMG, 2013</li> <li>2. Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security, 2<sup>nd</sup> Edition, PHI 2002.</li> </ol>	
<b>References:</b>	
<ol style="list-style-type: none"> <li>1. John W.Rittinghouse, William M.Hancock, Cyber Security operations Handbook, Elsevier Digital Press, 2003.</li> <li>2. Joseph Migga Kizza, Computer Network security, Springer International Edition, 2010.</li> <li>3. Prashant Mali, Cyber Law &amp; Cyber Crimes; Snow White publications, Mumbai</li> <li>4. Farooq Ahmad, Cyber Law in India, Pioneer Books</li> <li>5. Vakul Sharma, Information Technology Law and Practice; Universal Law Publishing Co. Pvt. Ltd.</li> <li>6. <a href="https://www.tutorialspoint.com">https://www.tutorialspoint.com</a></li> </ol>	
<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Define the Network security Technologies  <b>CO2:</b> Recognise the Computer and Network forensics  <b>CO3:</b> Describe IT acts and amendments  <b>CO4:</b> To appraise the nature of attack  <b>CO5:</b> To infer the meaning of different types of cyber activities</p>

**Mapping of COs with PSOs:**

CO Vs PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO1</b>	3	1	1	-	1
<b>CO2</b>	3	1	3	-	1
<b>CO3</b>	2	3	-	-	3
<b>CO4</b>	3	2	2	-	2
<b>CO5</b>	3	2	1	-	2

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