

MASTER OF COMPUTER APPLICATIONS

SYLLABUS

(For the students joining in 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
(Under Choice Based Credit System)**

**SUBJECTS OF STUDY AND SCHEME OF EXAMINATION
(For the students joining in 2018– 2019 and afterwards)**

Code No.	Subject	Credits	Lecture Hrs/ Week	Lab Hrs/ Week	Evaluation		Total
					CFA	ESE	
SEMESTER – I							
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
18GTPP0001	Gandhi in Everyday Life	-	2	-	50	-	50
Total Credits		22					
SEMESTER – II							
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
Total Credits		22					
SEMESTER – III							
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
Total Credits		22					

Code No.	Subject	Credits	Lecture Hrs/Week	Lab Hrs/Week	Evaluation		Total
					CFA	ESE	
SEMESTER – IV							
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
Total Credits		22					
SEMESTER – V							
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
Total Credits		24					
SEMESTER – VI							
18MCAP0628	Dissertation **	14	-	-	75	75+50	200
Total Credits for MCA Programme		126					

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

18MCAP0101	PROGRAMMING IN C		
Credits	Theory: 4	Practical:0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> • To impart the Principles of Programming in C Language • To lay the foundation for the students to learn other advanced programming languages • To motivate the students to develop projects in C 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> • Thorough knowledge on the basics of C Programming • Ability to use the Control and Decision making concepts of C in problem solving • Comprehensive understanding on the concepts of Functions in C and their usage in real-time problem solving • Develop analytical ability in the usage of Arrays and Structures, Pointers, Files and Command line arguments • On completion of this course, the students are expected be proficient in developing simple projects in C programming language 			

UNIT	CONTENTS	Lecture Schedule
I	C Language Fundamentals	12
	Program Structure	2
	Identifiers – Data Types – Integer – Float – Character – Constants – Variables	4
	Operators and Expressions	4
	Managing Input and Output Operations.	2
II	C Control Structures	13
	Decision making with if Statement – if ... else Statement – Nested if ... else Statements	6
	Loop Statement: for Statement – do... while Statement – while ... do Statement – goto Statement – switch Statement	7
III	C Functions and its Categories	13
	Mathematical Functions – sin – cos – tan – asin – acos – atan – sqrt – pow – log	3
	String Functions – strcpy – strcat – strcmp – strlen – strlen – strlwr –strupr	4
	User-Defined Functions	6
IV	Arrays and Structures	14
	Arrays – Definition – Declaration – Entering Values in Arrays – Manipulating Arrays – Passing an Array	7
	Structure and Union: Definition – Assigning Structure Variable – Assigning Initial Values – Using a Structure – Structure Arrays – Structures and Functions-Union	7

V	Pointers and File Operations	14
	Understanding Pointers – Pointers and Functions	6
	File Operations: Understanding Files – Declaring a File – Opening a File – Closing a File – File Input and Output Functions	4
	Formatted Input and Output – Working With Structures – Adding Data to a File – Reading and Printing a Disk File	4
Total Contact Hours		64

Text Book:

1. Programming in ANSI C, E. Balagurusamy, Tata McGraw Hill, 2011.

Reference Books:

1. Programming in C, 4th ed, Stephen G. Kochan, Pearson Education, 2015.
2. Programming with C , 2 nd Edition, Byron Gottfried, 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>

18MCAP0102	COMPUTER ORGANISATION		
Credits	Theory: 4	Practical:0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> This course imparts knowledge on the basics of designing a computer system and their working principles, using logic circuits. 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> To identify the basic functional components of a computer, basic gates and their construction procedures. It helps to familiarize the computer number systems and their representation in processing Understand working of a register and basic computer. Understand the functional details of CPU and other processors Understand the nature of data transfer among peripherals and computer through interface units Identify the different forms of memories units and their working principles 			

UNIT	CONTENTS	Lecture Schedule
	Digital Logic Circuits, Components and Data Representation	15
I	• Digital Logic Circuits: Digital Computers – Logic Gates – Boolean Algebra	2
	• Map Simplification – Combinational Circuits	2
	• Flip-Flops – Sequential Circuits	2
	• Digital Components: Integrated Circuits – Decoders – Multiplexers	2
	• Registers – Shift Registers – Binary Counters	2
	• Memory Unit	1
	• Data Representation: Data Types – Complements – Fixed Point Representation	2
	• Floating Point Representation – Error Detection Codes.	2
	Register Transfer and Micro Operations & Basic Computer Organisation and Design	11
II	• Register Transfer and Micro Operations: Register Transfer Language – Register Transfer – Bus and Memory Transfers	1
	• Arithmetic Micro Operations – Logic Micro Operations	2
	• Shift Micro Operations – Arithmetic Logic Shift Unit.	2
	• Basic Computer Organisation and Design: Instruction Codes – Computer Registers – Computer Instructions – Timing and Control	3
	• Instruction Cycle – Memory Reference Instructions – Input– Output and Interrupt	3
	Central Processing Unit	13
III	• Central Processing Unit: General Register Organisation	4
	• Stack Organisation	2
	• Instruction Formats – Addressing Modes	4

	• Data Transfer And Manipulation – Program Control	2
	• Reduced Instruction Set Computer (RISC)	1
	Input–Output Organisation	12
IV	• Input–Output Organisation: Peripheral Devices	2
	• Input– Output Interface	2
	• Asynchronous Data Transfer	2
	• Modes of Transfer	2
	• Priority Interrupts	2
	• Direct Memory Access	2
		Memory Organisation
V	• Memory Organisation: Memory Hierarchy – Main Memory – Auxiliary Memory	3
	• Associative Memory	2
	• Cache Memory	2
	• Virtual Memory	3
	• Memory Management Hardware	3
Total Contact Hours		64
Text Book:		
1. Computer System Architecture, M. Moris Mano, 3/e, Prentice Hall of India, New Delhi, 2003. Chapters : 1,2,3,4,5.1-5.7,8,11.1-11.6,12.1-12.6.		
Reference Books:		
1. Computer Architecture and Organisation, J.P.Hayes, Tata McGraw–Hill, 1993.		
2. Computer Organisation, Hamachar V.C., Vanesic Z.G., Zaky S.G., Tata McGraw–Hill, 1978.		

18MCAP0103	DESIGN AND ANALYSIS OF ALGORITHMS		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> To provide a broad understanding of the fundamental strategies of algorithm design and performance analysis. To enable the students to write efficient and effective algorithms using the appropriate design strategy for solving a given problem 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> Describe the basic concepts of time and space complexities and comprehend the fundamental principle of recursion and its effectiveness through typical examples Understand the various graph representations' and sorting techniques Describe the procedure of Greedy method and its application in solving problems Illustrate the concept of Dynamic programming with suitable applications Explain the principle of Backtracking and its application in solving 8-Queens problem and Sum of Subsets problem 			

UNIT	CONTENTS	Lecture Schedule
I	Introduction & Algorithm Specification	14
	• Introduction: What is an Algorithm?	3
	• Algorithm Specification: Recursive Algorithms	3
	• Performance Analysis: Space Complexity -Time Complexity-Asymptotic Notations	8
II	Graphs	14
	• Graphs: Introduction -Definition -Graph Representations	5
	• Divide and Conquer-General Method-Binary Search -Merge Sort, Quick Sort, Selection Sort	9
III	The Greedy Method	13
	• The Greedy Method: General Method -Knapsack Problem-Job Sequencing with Deadlines	5
	• Minimum Cost Spanning Trees: Prim's Algorithm -Kruskal's Algorithm - Optimal Merge Patterns -Single Source Shortest Paths	8
IV	Dynamic Programming	11
	• Dynamic Programming: General Method -Multistage Graphs - All-Pair Shortest Paths	5
	• Optimal Binary Search Trees -Traveling Salesperson Problem	6
V	Backtracking	12
	• Backtracking: General Method - 8 Queens Problem	7
	• Sum of Subsets -Graph Coloring -Hamiltonian Cycles	5
Total Contact Hours		64
Text Book:		
1. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2/e, Universities Press, 2007.		

Reference Books:

1. The Design and Analysis of Computer Algorithms, Alfred Aho, John E. Hopcroft, Jeffrey D. Ullman, Pearson Education, 2004.
2. Computer Algorithms, Introduction to Design and Analysis, Sara Base, Allen Van, 3/e, Pearson Education, 2002
3. Introduction to Algorithms, 2/e, T. H. Cormen, C. E. Leiserson, R.L.Rivest and C. Stein, Prentice Hall of India Pvt. Ltd, 2003.

18MCAP0104	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE		
Credits	Theory: 4	Practical:0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> • To teach the fundamental concepts of Mathematics which are essential for mathematical thinking. • To correlate the logical thinking in application development with mathematics 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> • Students will be able to demonstrate understanding of the mathematical basis of common algorithms, and the ability to calculate accurately and efficiently. • Students will have the capacity to demonstrate the ability to solve problems, including applications outside of mathematics, by means of intuition, creativity, guessing, and the experience gained through the study of particular examples and mathematical models. • Students will demonstrate the ability to communicate mathematical ideas clearly. They will use correct mathematical terminology and proper mathematical notation. • Students will be able to design and write computer programs that are correct, simple, clear, efficient, well organized, and well documented. • Students will be able to understand basic concepts in graphs which has lot of applications in computer science. • Students can understand the different Technique to solve matrix theory problem in an effective and efficient manner. 			

UNIT	CONTENTS	Lecture Schedule
I	Mathematical Logic	12
	• Mathematical Logic – Statements and Notations –Connectives.	3
	• Normal Forms-The Theory of Inference for the Statement Calculus	3
	• The Predicate Calculus	3
	• Inference Theory and Predicate Calculus	3
II	Set Theory	12
	• Set Theory: Basic Concepts of Set Theory, Notation, Inclusion and Equality of Sets	3
	• The Power Set, Some Operations of Sets, Venn Diagrams, Some Basic Set Identities, The Principles of Specification, Ordered Pairs and N-Tuples	3
	• Cartesian Products – Relations and Ordering – Relations, Properties of Binary Relations in a Set, Relation Matrix and the Graph of a Relation,	3
	• Partition and Covering of a Set, Equivalence Relations, Compatibility Relations, Composition of Binary Relations, Partial Ordering, Partially Ordered Set: Representation and Associated Terminology	3
III	Functions	13
	• Definition and Introduction, Composition of Functions	4
	• Inverse Functions, Binary and N-ary Operations	3

	<ul style="list-style-type: none"> • Characteristic Function of a Set, Hashing Functions 	3
	<ul style="list-style-type: none"> • Natural Numbers - Peano's Axioms and Mathematical Induction 	3
	Matrices	13
IV	<ul style="list-style-type: none"> • Matrices: Matrix Operations - Rules of Matrix Arithmetic - 	4
	<ul style="list-style-type: none"> • Eigen Values and Eigen Vectors 	3
	<ul style="list-style-type: none"> • Diagonalization Theorem (Problem only, No Proof) and Rank 	3
	<ul style="list-style-type: none"> • Cayley Hamilton theorem- Problems 	3
	Graph Theory	14
V	<ul style="list-style-type: none"> • Graph as Models – Vertex degrees Subgraph – Path 	4
	<ul style="list-style-type: none"> • Cycle - Matrix Representation of graphs- Fusion – Trees & Connectivity 	4
	<ul style="list-style-type: none"> • Bridges – Spanning Trees – Connector Problem 	3
	<ul style="list-style-type: none"> • Kruskal's Algorithm – Piori's Algorithm 	3
Total Contact Hours		64

Text Books:

1. Discrete Mathematical Structures with Application to Computer Science, J.B.Tremblay and R.Manohar, McGraw– Hill International Edition, 1987
2. Elementary Linear Algebra, Howard Anton, 4/e, John Wiley & Sons, 1984.
3. Modern Algebra, Arumugam S Issac, SCITech Publications, 2008.(For unit II,III)
4. A First Look at Graph Theory, by John clark, Allied Publisher's Ltd.(For unit V, Section 1.1 to 1.8 & 2.1 to 2.4)

Reference Books:

1. Applied Discrete Structures for Computer Science, D.Alan, L.Lenneth, Galgotia Publications, 1983.
2. Formal Languages and their Relations to Automata, J.E. Hopcroft and J.D. Ullman, Addison – Wesley Publishing Company, 1969.
3. Elements of Discrete Mathematics, C.Liu and D. Mohapatra, McGraw Hill. 2008.

18COPP01A1	ACCOUNTING AND FINANCIAL STATEMENT ANALYSIS		
Credits	Theory: 4	Practical:0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> To enable the students to understand the basic concepts of Accounting and analysis of Financial Statements which would enable them to apply the concepts in computerized business management setting? 			
LEARNING OUTCOMES:			
<p>Upon successful completion of the course, the students would have knowledge and skills in</p> <ul style="list-style-type: none"> Maintaining the accounting Books Preparing of Financial Statements from books Analysing the Financial Statements with appropriate accounting tools Drawing Information from the financial statements for the use of management in making financial and working capital decisions Preparing the cost sheets from the accounting data and information 			

UNIT	CONTENTS	Lecture Schedule
I	Introduction to Accounting & Accounting Principles	12
	• Definition, Meaning and Objects of Accounting	1
	• Systems of Accounting	1
	• Branches of Accounting	1
	• Accounting Cycle	1
	• Functions of Accounting	2
	• Advantages and Disadvantages of Accounting	1
	• Accounting Principles : Concepts and Conventions	3
	• Computerisation of Accounting	1
	• Advantages and Limitations	1
II	Recording of Business Transactions & Journal and Subsidiary Books	15
	• Identification & Analysis of Transactions	2
	• Journal and Subsidiary Books	2
	• Journalising	5
	• Posting	1
	• Balancing and Preparation of Trial Balance	2
• The concept of Error and their Rectification	3	
III	Financial Statements	12
	• Meaning and Nature of Financial Statements	1
	• Final Accounts and Balance Sheet	1
	• Limitations of Financial Statements	1
	• Analysis and Interpretation of Financial Statements	1
	• Meaning and Purpose	1
	• Tools and Methods of Financial Statement Analysis	1

	• Comparative Statements	3
	• Common size Statements	3
IV	Ratio Analysis	12
	• Ratio Analysis	6
	• Funds flow statements.	3
	• Cash flow statements.	3
V	Cost Accounting	12
	• Cost Accounting: Meaning and Purpose of Costing	1
	• Elements of Cost	3
	• Classification of Costs	2
	• Preparation and Analysis of Cost Sheet	6
Total Contact Hours		63
Reference Books:		
1. Financial Accounting, 4/e, S. M. Maheswari and S. K. Maheswari, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.		
2. Cost and Management and Accounting: Theory and Problem, M.N.Arora, Himalaya Publishing House, Mumbai, 2010.		
3. Accounting for Management, S.P.Jain, K.L.Narang and Simi Agrawal, Kalyani Publishers, New Delhi, 2009.		
4. Advanced Accountancy, R.L.Gupta, S.Chand & Sons, New Delhi, 1981.		
5. Management Accounting, Financial Management and Holding Company Accounting, S.Nagarathinam, S,Chand and Co., New Delhi, 1989.		

18MCAP0105	LAB - I: C PROGRAMMING & ALGORITHMS	
Credits	Theory: 0	Practical:1
	Total Credits: 1	
I. C Programs with <ol style="list-style-type: none"> Control Structures: while, do...while, for, if...else, switch, continue, break Array Handling: Single dimensional, Multidimensional Pointers Functions: Simple and Recursive Functions, Functions and Pointers File Handling Simple Graphics 		
II. Algorithms <ol style="list-style-type: none"> Knapsack problem Prim's algorithm Multistage graphs All pairs shortest paths 8 Queens problem Sum of Subsets Hamiltonian Cycle Sorting – Heap, Merge, Selection, Quick 		

18MCAP0106	LAB– II: MULTIMEDIA		Credit: 1
Credits	Theory: 0	Practical:1	Total Credits: 1
Simple programs using FLASH <ol style="list-style-type: none"> Tools and workspace utilization Animation Graphics effects Text effects Importing Audio and Video Action Script Publishing Flash content Mini project (Team Work) 			
Case Study: <ol style="list-style-type: none"> Photoshop [Images] Cool 3D [Text] Audacity [Sound] Power Director Pro, Video Cutter [Video] 			

18GTPP0001	GANDHI IN EVERYDAY LIFE		
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SEMESTER II

18MCAP0207	OBJECT ORIENTED PROGRAMMING IN C++		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> • To prepare object-oriented design for small/medium scale problems • To demonstrate the differences between traditional imperative design and object-oriented design • To explain class structures as fundamental, modular building blocks • To understand the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> • Understand the basics of OOPs, OOP languages, Applications of OOP and C++ programming constructs. • Understand the role of functions in C++ and defining the C++ user defined data type class and its usage to create objects. • Familiarize the reusability of existing class and providing new meaning to existing operators. • Familiarize the efficient usage of memory through operators and virtual function usage among inherited objects • Understand the storage of data into file forms. 			

UNIT	CONTENTS	Lecture Schedule
I	Principles of Object–Oriented Programming	13
	<ul style="list-style-type: none"> • Principles of Object–Oriented Programming : Basic Concepts of Object– Oriented Programming - Benefits 	4
	<ul style="list-style-type: none"> • Object–Oriented Languages – Applications of OOP 	2
	<ul style="list-style-type: none"> • Beginning with C++ – Tokens 	3
	<ul style="list-style-type: none"> • Expressions and Control Structures 	4
II	Functions & Classes and Objects	13
	<ul style="list-style-type: none"> • Functions in C++ 	2
	<ul style="list-style-type: none"> • Classes and Objects – Specifying a Class – Declaring Objects – Defining Member Functions 	4
	<ul style="list-style-type: none"> • Static Data Members and Member Functions – Array of Objects -Friendly functions –const Member Functions, Data Members and Objects 	4
	<ul style="list-style-type: none"> • Constructors – Constructor Types, Destructors. 	3
III	Operator Overloading and Inheritance	13
	<ul style="list-style-type: none"> • Operator Overloading and Inheritance: Defining Operator Overloading – Overloading Unary Operators 	3
	<ul style="list-style-type: none"> • Overloading Binary Operators – Manipulation of String using Operators 	3
	<ul style="list-style-type: none"> • Inheritance – Defining Derived Class – Protected Derivation - Single Inheritance-Multilevel Inheritance – Multiple Inheritance 	3

	<ul style="list-style-type: none"> • Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract Class – Constructors in Derived Class. 	4
IV	Pointers & Virtual Functions	13
	<ul style="list-style-type: none"> • Pointers – new and delete operators 	3
	<ul style="list-style-type: none"> • Pointers to Objects – this Pointer 	4
	<ul style="list-style-type: none"> • Pointers to Derived Classes 	3
	<ul style="list-style-type: none"> • Virtual Functions – Pure Virtual Functions. 	3
V	Files	12
	<ul style="list-style-type: none"> • Working with Files: Classes for File Stream Operations – Opening and Closing a File 	3
	<ul style="list-style-type: none"> • File Pointers and their Manipulations 	3
	<ul style="list-style-type: none"> • Sequential Input and Output Operations – Error Handling during File Operations 	4
	<ul style="list-style-type: none"> • Command Line Arguments 	2
Total Contact Hours		64

Text Book:

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

Reference Books:

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

18MCAP0208	OPERATING SYSTEMS		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> • To provide in-depth knowledge on basic design and working principles of operating system • To learn the internal structure of some common operating systems • To impart a clear idea on recent growth in fundamental areas that affect operating systems like Multicore systems & Mobile computing 			
LEARNING OUTCOMES:			
<p>At the end of the course students will be able to:</p> <ul style="list-style-type: none"> • Understand the basic structure, functions, main principles and techniques of operating system • Quantitatively discuss the behavior of different CPU scheduling algorithms • Understand the cause and effect of deadlocks and able to analyze them related to common circumstances in operating systems • Know deadlock prevention, avoidance, detection and recovery techniques • Understand the basics of memory management, the use of virtual memory in modern operating systems as well as the various page replacement algorithms 			

UNIT	CONTENTS	Lecture Schedule
I	Introduction	12
	• Operating Systems	1
	• Computer-System Organization	1
	• Computer-System Architecture	1
	• Operating-System Structure	1
	• Operating-System Operations	1
	• Process Management	1
	• Memory Management	1
	• Storage Management	1
	• Protection and Security	1
	• Kernel Data Structures	1
	• Computing Environments	1
• Open-Source Operating Systems	1	
II	Operating System Structures	12
	• Operating-System Services	1
	• User Operating-System Interface	1
	• System Calls	2
	• Types of System Calls	1
	• System Programs	1
	• Operating-System Design and Implementation	1
	• Operating-System Structure	1
	• Operating-System Debugging	1
	• Operating-System Generation	2
• System Boot	1	

III	Processes	13
	• Process Concept	1
	• Process Scheduling	1
	• Operations on Processes	1
	• Interprocess Communication	1
	• Examples of IPC Systems	1
	• Communication in Client- Server Systems	1
	• Threads - Overview - Multicore Programming	2
	• Multithreading Models	1
	• Thread Libraries	1
	• Implicit Threading	1
	• Threading Issues	1
• Operating-System Examples	1	
IV	CPU Scheduling	13
	• Basic Concepts - Scheduling Criteria	1
	• Scheduling Algorithms	1
	• Thread Scheduling	1
	• Multiple-Processor Scheduling	1
	• Real-Time CPU Scheduling	1
	• Operating-System Examples	1
	• Deadlocks - System Model	1
	• Deadlock Characterization	1
	• Methods for Handling Deadlocks	1
	• Deadlock Prevention	1
	• Deadlock Avoidance	1
	• Deadlock Detection	1
• Recovery from Deadlock	1	
V	Memory Management	14
	• Main Memory Background - Swapping	1
	• Contiguous Memory Allocation	1
	• Segmentation	1
	• Paging	1
	• Structure of the Page Table	1
	• Virtual Memory Background	1
	• Demand Paging	1
	• Copy-on-Write	1
	• Page Replacement	1
	• Allocation of Frames	1
	• Thrashing	1
• Memory-Mapped Files	1	
	• Allocating Kernel Memory	1
	• Other Considerations - Operating-System Examples	1
Total Contact Hours		64
Text Book:		
1. Operating System Concepts, 9 th ed, Silberschatz , Galvin & Gagne, John Wiley & Sons, Inc., 2013.		

Reference Books:

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

18MCAP0209	DATA AND FILE STRUCTURES		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> To provide a broad understanding of the representation of data structures and their applications To impart a clear idea on various types of file structures 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> Understand the representation of single dimensional and multi-dimensional arrays and their applications Describe the data representation of linked list and its variants Demonstrate the representation and primitive operations of Stacks and Queues Understand the representation of binary trees and its various types and describe the binary tree traversals with algorithms and examples Depict the different types of file structures 			

UNIT	CONTENTS	Lecture Schedule
	Arrays	12
I	<ul style="list-style-type: none"> Arrays: Definition- One dimensional array: Memory allocation for an array -Operations on arrays -Applications of arrays 	6
	<ul style="list-style-type: none"> Multidimensional array: Two dimensional arrays -Sparse matrices-Three dimensional and n-dimensional arrays 	6
	Linked Lists	12
II	<ul style="list-style-type: none"> Linked Lists: Single linked list -Circular linked list -Double linked lists-Circular double linked list 	9
	<ul style="list-style-type: none"> Applications of linked list 	3
	Stacks and Queues	14
III	<ul style="list-style-type: none"> Stack : Definition -Representation of a Stack -Operations on Stack -Applications of Stacks 	7
	<ul style="list-style-type: none"> Queue :Definition -Representation of Queues -Various Queue structures-Applications of Queues 	7
	Trees and Hash Tables	13
IV	<ul style="list-style-type: none"> Trees and Hash Tables: Definition and Concepts - Representations of binary tree -Operations on a binary tree 	5
	<ul style="list-style-type: none"> Binary tree traversal -Types of Binary trees – Expression Tree – Binary Search Trees – Heap Tree - Trees and Forests 	5
	<ul style="list-style-type: none"> Hash Tables 	3
	File Structures	13
V	<ul style="list-style-type: none"> File Structures: 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 	5

	Commands	
	• Field and Record Organization: Field structures, Record structures-Indexed Sequential Access	4
	• Maintaining a Sequence Set: Use of Blocks -Adding a simple index to the sequence set	4
Total Contact Hours		64
Text Books:		
1. Classic Data Structures , Debasis Samanta, PHI Learning Pvt. Ltd., Second Edition, 2009.		
2. File Structures – An Object – Oriented approach with C++, Mecheal J. Flok, Bill Zoellick, Greg Riccardi, Pearson Edition, 2005.		
Reference Books:		
1. Fundamentals of Data Structures in C++, Horowitz, Shani,Dinesh Mehta, Galgotia Publications, 2008.		
2. Data Structures using C and C++, yedidhayah Langsam, Moshe J.Augenstien, Aaron M.Tanebaum, 2/e, PHI, 1999		
3. Data Structures and Algorithm Analysis in C++, Mark AllenWeiss, AWL publications, 1994.		

18MCAP0210	MICROPROCESSORS AND APPLICATIONS		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
Students should be able to understand <ul style="list-style-type: none"> • The different types of Microprocessors • Basics of Assembly language programming (ALP) • Interconnection of Microprocessor with other devices 			
LEARNING OUTCOMES:			
Students should be able to <ul style="list-style-type: none"> • Explain the different types of Microprocessors • Recognize the basics of Assembly language programming (ALP) • Write simple programmes in ALP • Understand the Architecture of advance Microprocessors • Understand the interconnection of Microprocessor with other devices 			

UNIT	CONTENTS	Lecture Hours
I	Introduction	12
	• Computers, Microprocessors, and Microprocessors - an Introduction	2
	• Computers - The 8086, 8088, 80186,80188,80286 Microprocessors	2
	• Introduction - 8086 Internal Architecture	1
	• Introduction to programming the 8086	1
	• 8086 Family Assembly language programming	1
	• Introduction - Program Development steps	1
	• Constructing the Machine Codes for 8086 instructions	1
	• Writing Programs for use with an assembler	1
• Assembly language program development tools.	2	
II	8086 assembly language programming Techniques	13
	• 8086 assembly language programming Techniques- objectives	3
	• Practice with simple sequence programs	2
	• Flags, Jumps and WHILE	2
	• DO implementations	2
	• REPEAT-UNTIL implementation and examples	2
• Debugging assembly language programs	2	
III	Conditional Statements	13
	• IF-THEN-ELSE structures	2
	• procedures and Macros	3
	• IF-THEN	2
	• IF-THEN and multiple IF THEN-ELSE programs	2
	• Writing and using procedures	2
• Writing and using assembler macros	2	

IV	8086 Instruction Descriptions and Assembler Directives	13
	• 8086 Instruction Descriptions and Assembler Directives	2
	• Unix operating system	2
	• Structure, operations of the Kernel shell, application layer.	2
	• 80286 microprocessor – architecture	1
	• Real address mode - memory management scheme	1
	• Descriptors - accessing segments	1
	• Address translation registers and physical address	1
	• Protection mechanisms - task switching and task gates	1
	• Interrupt handling in PVAM - instructions for PVAM.	2
V	Digital Interfacing	13
	• Digital Interfacing – Objectives	2
	• Programmable parallel ports and handshake	2
	• Input/output	2
	• Interfacing a microprocessor to keyboards	2
	• Interfacing to alphanumeric ports to high power devices	2
	• Optical motor shaft encoders	3
Total Contact Hours		64
Text Book:		
1. Microprocessors and Interfacing - Programming and Hardware, D.V. Hall, Seventh Reprint, Tata McGraw Hill Edition, New Delhi, 1995.		
Reference Books:		
1. Introduction to Microprocessors, A.P. Mathur, 3/e, Tata McGrawHill Company Limited, New Delhi 1994.		
2. Microprocessor and Micro Computer based System Design, 2/e, Mohamed Rafiquzzman, CRC Press, 1995.		
3. PC Architecture & Assembly Language, B. Kauler, Galgotia Publication, New Delhi, 1995.		

18MATP02A1	NUMERICAL AND STATISTICAL METHODS (Proofs of theorems and derivations are not expected)		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVE:			
<ul style="list-style-type: none"> To impart the skills in the applications of various Numerical and Statistical Methods. 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations. Differentiate between the mean, the median, and the mode of data differentiate between the mean, the median, and the mode of data Determine whether the correlation and regression are significant. Demonstrate an understanding of the basic concepts of probability and random variables. 			

UNIT	CONTENTS	Lecture Schedule
I	Curve Fitting	14
	Curve Fitting: Methods of Least Squares- Fitting Straight Line- Fitting a Parabola-Fitting an Exponential Curve	4
	Solution of Numerical and Transcendental Equations: The Bisection Method-Method of False Position	3
	Solution of Simultaneous Linear Algebraic Equations: Gauss Elimination Method- Gauss Jordan Method- Jacobi Method of Iteration, Gauss Seidel Method	4
	Related problems	3
II	Interpolation	12
	Interpolation : Difference Tables-Newton's Forward and Backward Interpolation Formula for Equal Intervals	3
	Lagrange's Interpolation Formula for Unequal interval	3
	Numerical Integration: Trapezoidal Rule- Simpson's 3/8 th Rule	3
	Related problems	3
III	Frequency Distribution	13
	Frequency Distribution: Diagrammatic Graphical Presentation of Frequency Distributions	3
	Measures of Central Value	4
	Standard Deviation - Coefficient of Variance	3
	Skewness – Kurtosis	3
IV	Correlation	12
	Correlation : Scatter Diagram- Karl Pearson's Coefficient of Correlation- Correlation Coefficient for a Bivariate frequency Distribution	4
	Rank Correlation	3
	Regression	2
	Related problems	3

V	Probability	13
	Probability: Introduction-Calculation of Probability	4
	Conditional Probability: Bayes' Theorem- Mathematical Expectation	3
	Theoretical Distributions: Binomial Distribution-Poisson Distributions	3
	Related problems	3
Total Contact Hours		64
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Numerical Methods in Science and Engineering, M.K. Venkataraman, 2/e, National Publishing Co., Madras, 1987, (Unit 1 & Unit 2). 2. Statistics, Arumugam S. Issac, SCITech 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). <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Numerical Methods for Scientific and Engineering Computation, M.K.Jain, S.R.K. Iyengar, R.K. Jain, Willey Eastern Limited, 2003. 2. Introductory Methods of Numerical Analysis, S.S. Sastry, Prentice – Hall of India, 4th Edition, 2010. 		

18MCAP0211	LAB – III: C++ PROGRAMMING & DFS		
Credits	Theory: 0	Practical: 1	Total Credits: 1
<p>I. C++ programs with</p> <ol style="list-style-type: none"> 1. Operator Overloading 2. String Manipulation 3. Inheritance – Single and Multiple 4. Pointers 5. Virtual Functions 6. Files and Streams <p>II. Data Structures</p> <ol style="list-style-type: none"> 1. Stack – Creation, Push and Pop, Conversion and evaluation of Prefix and Postfix expression 2. Queues – Creation, Insertion, Deletion 3. Linked list – Creation, Insertion and Deletion using Singly Linked List, Circular List and Doubly - Linked list. 4. Binary Trees – Creation, Tree traversals 5. Binary Search Tree – Creation, Searching and Deleting an element 			

18MCAP0212	LAB – IV: SHELL PROGRAMMING & ALP		
Credits	Theory: 0	Practical: 1	Total Credits: 1
<p>I. Shell Programming</p> <ol style="list-style-type: none"> 1. Operations on Directories and Files 2. Working with Editors 3. GUI Operations 4. Shell Programming 5. Implementing Scheduling Algorithms <p>II. ALP using MASM</p> <ol style="list-style-type: none"> 1. Simple Sequence Programming 2. Branching, Jumping and Looping 3. Programming with Macro 4. Use of Subroutines 5. Use of Assembler Directives 6. Applications – Simple Multiplication, Sorting, Binary to BCD and BCD to Seven Segment Code 			

18ENGP00C1	COMMUNICATION AND SOFT SKILLS
OBJECTIVES:	
<ul style="list-style-type: none"> • To develop inter personal skills and be an effective goal oriented team player. • To develop professionals with idealistic, practical and moral values. • To develop communication and problem solving skills. • To re-engineer attitude and understand its influence on behavior. 	
LEARNING OUTCOMES:	
Students should be able to <ul style="list-style-type: none"> • Good communication and soft skills. • Improved inter personal skills. • Ability of self-analysis. 	

UNIT	CONTENTS	Lecture Schedule
I	SELF ANALYSIS	4
	SWOT Analysis, Who am I, Attributes	2
	Importance of Self Confidence, Self Esteem	2
II	ATTITUDE	4
	Factors influencing Attitude, Challenges and lessons from Attitude	2
	Change Management Exploring challenges, Risking Comfort Zone, Managing Change	2
III	MOTIVATIONS	6
	Factors of motivation, Self-Talk	3
	Intrinsic & Extrinsic Motivators	3
IV	GOAL SETTING	6
	Wish List, SMART Goals, Blue print success, Short Term, Long Term	2
	Life time Goals, Time Management Value of time, Diagnosing Time Management	2
	Weekly Planner to do list, Prioritizing work.	2
V	CREATIVITY	10
	Out of box Thinking	5
	Lateral Thinking Presentation	5
Total Contact Hours		30

SEMESTER III

18MCAP0313	JAVA PROGRAMMING		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> Provide the foundation to the object oriented programming concepts. Discuss the implementation of OOP concepts in Java language To make learners a good Java programmers To import skills and knowledge to create and run Java programs for solving real time problems. 			
LEARNING OUTCOMES:			
<p>Upon completion of this course, students should be able to:</p> <ul style="list-style-type: none"> Understand the concepts of OOP. Knows the basic Java language features, types, control statements and array. Grasped the idea of inheritance, package and identify classes, objects, members of a class and the relationships among them needed for a specific problem. Learned the implementation of mathematical methods. To solve engineering and scientific problems. Knows exception handling, threads and usage of Wrapper classes. Learned the methods in String. Knows how threads are used to perform subtasks and Inter-thread communication. Knows how to develop the client side programming using an applet will be able to graphics objects using AWT. 			

UNIT	CONTENTS	Lecture Schedule
I	Introduction and Control Statements & Arrays	13
	<ul style="list-style-type: none"> Introduction – Object-Oriented Programming Concepts, Encapsulation, inheritance, polymorphism, features of Java, Types of Java programs, Java architecture 	2
	<ul style="list-style-type: none"> Literals - integer, floating point, character, string and boolean literals. Data types - integer, floating point , character and boolean. Variables 	2
	<ul style="list-style-type: none"> The structure of a Java program – comments, Expressions and Statements, Type conversion, block statements and scope 	2
	<ul style="list-style-type: none"> Operators –arithmetic, bitwise relational, boolean logical and Ternary. Operator precedence 	3
	<ul style="list-style-type: none"> Control statements – if...else, switch, while , do...while, for..., Break, continue and comma statement. 	2
	<ul style="list-style-type: none"> Arrays - one-dimensional and multi-dimensional arrays 	2
	Classes, Constructors & Inheritance	12
	<ul style="list-style-type: none"> Classes – defining a class, the new operator and objects, the dot Operator, method declaration and calling 	2

II	<ul style="list-style-type: none"> Constructors, instance variable hiding, this in constructor, method Overloading, passing objects as parameters to methods 	2
	<ul style="list-style-type: none"> Inheritance – creating subclasses, method overriding, final class, Final method, final variables 	3
	<ul style="list-style-type: none"> Object destruction and garbage collection, recursion, static Method, static variables and static block. 	2
	<ul style="list-style-type: none"> Package, the import statement, access modifier, interfaces, Defining interfaces, implementing an interface 	3
III	Wrapper classes & Input and Output classes	13
	<ul style="list-style-type: none"> Wrapper classes – the number class - Byte, Short, Integer, Long, Float, Double, Character and Boolean classes. 	2
	<ul style="list-style-type: none"> Mathematical methods - exceptions -types of exceptions 	1
	<ul style="list-style-type: none"> 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. 	2
	<ul style="list-style-type: none"> Input and Output classes - i/o streams, the file class, byte stream, InputStream, OutputStream, disk file handling, FileInputStream, FileOutputStream, ByteArrayInputStream 	3
	<ul style="list-style-type: none"> ByteArrayOutputStream, filtered byte streams, BufferedInputStream, BufferedOutputStream, DataInputStream, DataOutputStream, 	2
	<ul style="list-style-type: none"> SequenceInputStream, ObjectOutputStream, ObjectInputStream, random access file, character stream, CharArrayReader CharArrayWriter, InputStreamReader, OutputStreamWriter 	2
	<ul style="list-style-type: none"> FileWriter, FileReader, BufferedReader, BufferedWriter. 	1
IV	Strings & Threads	12
	<ul style="list-style-type: none"> Strings – the String class, equality operator(==) and equals method, string concatenation with + , the StringBuffer class. 	2
	<ul style="list-style-type: none"> Threads - multitasking, creating a thread, states of a thread 	3
	<ul style="list-style-type: none"> Multithreaded programming, thread priorities, join method 	3
	<ul style="list-style-type: none"> Controlling the threads 	2
	<ul style="list-style-type: none"> Synchronizing methods, inter-thread communication – wait, notify and notifyAll 	2
V	Applets & Graphics	14
	<ul style="list-style-type: none"> Applets – applet basics, methods of building an applet, some General methods of applet, displaying text in status bar, Embedding applet information 	2
	<ul style="list-style-type: none"> The html applet tag, reading parameters into applets, colors in Applet, getting documentbase and codebase, 	2
	<ul style="list-style-type: none"> Interfaces in applet, multimedia in applet, playing audio clips, Images in applet, applet showing other html pages. 	2
	<ul style="list-style-type: none"> Graphics - drawing lines, rectangles, ovals and circles, arcs, Polygons and polyline. 	2
	<ul style="list-style-type: none"> Creating a graphics clip, colors in graphics, constructors for Color Class, 	2
	<ul style="list-style-type: none"> Color methods, setting paint modes, 	2
	<ul style="list-style-type: none"> Fonts in graphics, determining fonts available - in the system - setting fonts. 	2

Total Contact Hours	64
Text Book:	
1. Programming in Java2, K.Somasundaram, Jaico Publishing House, New Delhi, 2009.	
Reference Books:	
1. Introduction to JAVA Programming, K. Somasundaram, Jaico Publishing House, New Delhi, 2013.	
2. Java2: The Complete Reference, H.Schildt, 4/e, TMH Publishing Company, New Delhi,2001.	
3. Foundation Classes, Mathew T.Nelson, McGraw–Hill, 1998.	
4. Do ‘n’ Learn JAVA – A Practical Approach, K.Somasundaram, Anuradha Publications, Chennai, 2013.	

18MCAP0314	PRINCIPLES OF COMPILER DESIGN		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> To provide in-depth knowledge about the design and intrinsic functioning of compilers To teach the purpose and functions of the phases of the compiler To elucidate the process of compilation of a source program with reference to the common programming languages. 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> The students learn the fundamentals of a compiler & the purpose and the working principles of the phases of compilers. They learn about the context-free grammars and various parsing techniques. They are taught to simulate the lexical analyzer and syntax analyzer of C Compiler. They learn about the types and sources of errors, from the compilers perspective. They thoroughly understand the procedures and principles involved in the machine code generation. 			

UNIT	CONTENTS	Lecture Schedule
I	Fundamentals of a Compiler	13
	• Structure of a Compiler	1
	• Lexical Analysis – Syntax Analysis – Intermediate Code Generation – Optimization	2
	• Code Generation – Bookkeeping – Error Handling	1
	• Compiler Writing Tools - Role of Lexical Analyzer	1
	• A Simple Approach to the Design of Lexical Analyzer	1
	• Regular Expressions	2
	• Finite Automata – Conversion from Regular Expressions to Finite Automata – Minimizing the Number of States of a DFA	3
II	• Language to Specify Lexical Analyzer – Implementation of a Lexical Analyzers.	2
	Context-Free Grammars	19
	• Context-Free Grammars	2
	• Derivations and Parse Trees	2
	• Capabilities of Context – Free Grammars	1
	• Parsers : Shift-Reduce Parsing	3
	• Operator Precedence Parsing	4
	• Top Down Parsing	3
• Predictive Parsers	4	
III	Lexical Analyzer and Syntax Analyzer	14
	• LR Parsers – Canonical Collection of LR(0) Items	3
	• Constructing SLR Parsing Tables	2
	• Canonical LR Parsing Table	2
	• LALR Parsing Tables	2

	• Syntax Directed Translation Schemes	1
	• Implementation of Syntax Directed Translators – Intermediate Code – Postfix Notation	1
	• Parse Trees and Syntax Trees	1
	• Three Address Code, Quadruple and Triples	1
	• Translation of Assignment Statements – Boolean Expressions	1
IV	Symbol Table	8
	• Contents of Symbol Table	2
	• Data Structures for Symbol Tables	2
	• Errors – Lexical Phase Errors	2
	• Syntactic Phase Errors – Semantic Errors	2
V	Object Programs	10
	• Object Programs – Problems in Code Generation	2
	• A Machine Model – A Simple Code Generator	2
	• Register Allocation and Assignment	2
	• Code Generation from DAG's	3
	• Peephole Optimization	1
Total Contact Hours		64
<p>Text Book:</p> <ol style="list-style-type: none"> Principles of Compiler Design, Alfred V. Aho & Jeffrey D. Ullman, Narosa Publishing House, 1985. <p>Reference Books:</p> <ol style="list-style-type: none"> Compiler Construction Principles and Practice – D.M.Dhamadhere, McMillan India Ltd., Madras, 1983. Compiler Design Theory, Lewis.P.M., Rosenkrantz D.J., Stearn R.E., Addison–Wesley, 1976. 		

18MCAP0315	DATABASE MANAGEMENT SYSTEMS		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> To teach the concepts of database management systems To make them familiar with various data models and database systems Ability to manipulate real time data and elicit useful information using database concepts 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> The students understand the components, functions and various database design techniques used for modeling the databases management system. They learn the clauses and functions of SQL and other relational languages like Tuple Relational Calculus and Domain Relational Calculus, and can write optimal queries in the above languages. They can design entity-relationship diagrams to represent simple database application scenarios and can understand the database schema normalization rules and techniques to criticize and improve the database design. They thoroughly understand the basic concept of transaction processing, concurrent transaction processing and recovery procedures They understand some of the advanced topics in database management such as object-relational databases and distributed databases 			

UNIT	CONTENTS	Lecture Schedule
	Introduction	12
I	<ul style="list-style-type: none"> Introduction: Database System Applications – Purpose of Database Systems 	1
	<ul style="list-style-type: none"> View of Data – Database Languages 	1
	<ul style="list-style-type: none"> Relational Databases – Database Design 	1
	<ul style="list-style-type: none"> Data Storage and Querying 	1
	<ul style="list-style-type: none"> Transaction Management, Database Architecture 	1
	<ul style="list-style-type: none"> Data Mining and Information Retrieval, Specialty Databases 	1
	<ul style="list-style-type: none"> Database Users and Administrators, History of Database Systems 	1
	<ul style="list-style-type: none"> Relational Model: Structure of Relational Databases 	1
	<ul style="list-style-type: none"> Database Schema, Keys 	1
	<ul style="list-style-type: none"> Schema Diagrams 	1
	<ul style="list-style-type: none"> Relational Query Languages, Relational Operations 	2
	Query Languages	12
II	<ul style="list-style-type: none"> Introduction to SQL: Overview of the SQL Query Languages 	1
	<ul style="list-style-type: none"> SQL Data Definition, Basic Structure of SQL Queries 	1
	<ul style="list-style-type: none"> Additional Basics Operations, Set Operations 	1
	<ul style="list-style-type: none"> Null Values, Aggregate Functions 	1
	<ul style="list-style-type: none"> Nested Subqueries, Modification of the Database 	1
	<ul style="list-style-type: none"> Intermediate SQL: Join Expression, Views 	1
	<ul style="list-style-type: none"> Transactions, Integrity Constraints 	1

	• Data Types and Schemas, Authorization	1
	• Formal Relational Languages: The Relational Algebra	2
	• The Tuple Relational Calculus	1
	• The Domain Relational Calculus	1
	Database Design	15
III	• Database Design and ER Model: Overview of the Design Process	1
	• The Entity Relationship Model, Constraints	1
	• Removing Redundant Attributes in Entity Sets, ER Diagrams	2
	• Reduction to Relational Schemas, ER Design Issues	1
	• Extended ER Features, Alternative Notations for Modeling data	1
	• Other Aspects of Database Design	2
	• Relational Database Design: Features of Good Relational Design	1
	• Atomic Domains and First Normal Form, Decomposition using Functional Dependencies	2
	• Functional Dependencies Theory, Algorithms for Decomposition	3
	• Decomposition using Multivalued Dependencies	1
	Transactions and Recovery	13
IV	• Transactions: Transaction Concept – Simple Transaction Model – Storage Structure	1
	• Transaction Atomicity and Durability	2
	• Transaction Isolation – Serializability	1
	• Transaction Isolation and Atomicity – Transaction Isolation Levels – Implementation of Isolation Levels – Transactions as SQL Statements	2
	• Recovery Systems: Failures Classification – Storage	2
	• Recovery and Atomicity – Recovery Algorithm	2
	• Buffer Management – Failure with Loss of Nonvolatile Storage	1
	• Early Lock Release and Logical Undo Operations	1
	• Remote Backup Systems	1
		Distributed and Object-Based Databases
V	• Distributed Databases: Homogeneous and Heterogeneous Databases	1
	• Distributed Data Storage	1
	• Distributed Transaction– Commit Protocols	1
	• Concurrency Control in Distributed Databases	2
	• Availability – Distributed Query Processing – Heterogeneous Distributed Databases	1
	• Cloud-Based Databases – Directory Systems	1
	• Object-Based Databases: Overview – Complex Data Types	1
	• Structured Types and Inheritance in SQL – Table Inheritance	1
	• Array and Multiset Types in SQL – Object Identity and Reference Types in SQL	1
	• Implementing O-R Features – Persistent Programming Languages	1

	<ul style="list-style-type: none"> Object Relational Mapping – Object-Oriented versus Object-Relational 	1
Total contact Hours		64
<p>Text Book:</p> <ol style="list-style-type: none"> Database System Concepts, 6/e, Avi Silberchartz, Henry F. Korth and S.Sudarshan, McGraw–Hill Higher Education, International Edition, 2010. <p>Reference Books:</p> <ol style="list-style-type: none"> Database Principles, 2/e, Peter Rob, Carlos Coronel, Steven A. Morris, Keeley Crockett, Cengage Learning, 2013 Fundamentals of Database Systems, 6/e, Ramez Elamassri and Shankant B–Navathe, Pearson Education Delhi, 2010. Database System Concepts, Peter Rob, Carlos Coronel, Cengage Learning, 2008. Database Development and Management, Lee Chao, Auerbach Publications, 2010. 		

18MCAP03EX	MAJOR ELECTIVE – I		
Credits	Theory: 4	Practical: 0	Total Credits: 4

18MCAP03MX	MODULAR COURSE - I		
Credits	Theory: 2	Practical: 0	Total Credits: 2

18MCAP0316	LAB – V: GUI & RDBMS		Credit: 1
Credits	Theory: 0	Practical: 1	Total Credits: 1
I. GUI (Visual Basic) <ol style="list-style-type: none"> 1. Simple programs using Basic Controls 2. Programs for Launching Applications using OLE Objects 3. Working with Menus, Dialog Boxes, Drag and Drop Events and ActiveX Controls 4. Programs to Handle Databases 			
II. RDBMS (Oracle) <ol style="list-style-type: none"> 1. Tables : Creations, Sorting, Setting relation between tables 2. Queries using single and multiple tables 3. Exception Handling, Cursor and Triggers 4. Importing Tables from Electronic Spreadsheet and Text File 5. Report from usage 			

18MCAP0317	LAB – VI: JAVA PROGRAMMING		
Credits	Theory: 0	Practical: 1	Total Credits: 1
I. Simple programs using <ol style="list-style-type: none"> 1. Control statements, arrays 2. Classes, Inheritance 3. Exception handling 4. Input / Output classes 5. Strings 6. Threads 7. Applets 8. Graphics 9. Event handling 10. Applications using the above concepts 			

18MCAP01F1	EXTENSION/FIELD VISIT
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18EXNP03V1	VILLAGE PLACEMENT PROGRAMME
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SEMESTER IV

18MCAP0418	WEB PROGRAMMING		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> To provide insight into the basics of the Web Programming To teach how to design and implement a dynamic web application using HTML, Javascript , PHP and MySql 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> Learn to design webpages using HTML and have practical experience in working with XML Add dynamic content to webpages using JavaScript Develop online web applications with database connectivity using PHP and MySQL Understand the basics of TCP/IP Protocols and IP address Have clear idea on the Domain Name System and its implementation. 			

UNIT	CONTENTS	Lecture Schedule
I	Introduction to HTML & CSS	13
	<ul style="list-style-type: none"> Introduction to HTML: Headings - Linking- Internal linking - Images- Special Characters and horizontal Rules 	4
	<ul style="list-style-type: none"> Lists- Tables- Forms- Meta elements 	3
	<ul style="list-style-type: none"> Cascading Style sheets: Inline Styles-Embedded Style Sheets- Conflicting Styles - Linking External Style Sheets 	3
	<ul style="list-style-type: none"> XML: Introduction -XML Basics-Structuring Data- Document Type Definitions 	3
II	Java Script, Objects & Dynamic HTML	13
	<ul style="list-style-type: none"> Java Script: Introduction to Scripting -Control Statements - Functions 	4
	<ul style="list-style-type: none"> Objects: Math object –Array Object-String Object 	3
	<ul style="list-style-type: none"> Document object - Boolean and Number objects -.Window object 	3
	<ul style="list-style-type: none"> Dynamic HTML: Events-Using cookies 	3
III	PHP Scripting Working with Files	12
	<ul style="list-style-type: none"> PHP Scripting: Create a Simple PHP Program -Using Variables in PHP- Operators and Expressions -Conditional and Branching Statements 	3
	<ul style="list-style-type: none"> Loops and Arrays - HTML Form fields and PHP 	3
	<ul style="list-style-type: none"> 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 	3
	<ul style="list-style-type: none"> PHP - MySQL Database Connectivity 	3
IV	An Introduction to TCP/IP	14
	<ul style="list-style-type: none"> An Introduction to TCP/IP: TCP/IP Basics - Addressing -Concept of IP address 	7

	<ul style="list-style-type: none"> Address Resolution Protocol(ARP) -Reverse Address Resolution Protocol(RARP) -Bootstrap Protocol – DHCP– ICMP 	7
V	Domain Name system (DNS) & Email	12
	<ul style="list-style-type: none"> Domain Name system (DNS): Introduction -Domain Name System -DNS Namespace -DNS server 	6
	<ul style="list-style-type: none"> Email: Introduction -SMTP -POP and IMAP -MIME -FTP -TFTP- Basics of WWW and HTTP. 	6
Total Contact Hours		64
<p>Text Books:</p> <ol style="list-style-type: none"> Internet and World Wide Web – How to Program, Deitel, , Fourth Edition, Pearson Prentice Hall,2009 Beginning PHP5, Dave W.Mercer, Allen Kent, Steven, Wiley– Dreamtech Publications 2004. Web Technologies, TCP/IP Architecture and Java Programming, Achyut S Godole & Atul Kahate, Second Edition, Tata Mc Graw Hill, 2010 <p>Reference Books:</p> <ol style="list-style-type: none"> Internet Programming, Kris jamsa and Ken cope, Galgotia Publications Pvt Ltd, 1995. HTML – The Complete Reference, Powell, Tata Mc Graw Hill, 1998. Mastering XML, Ann Navarre,Chuck White, BPB Publications, 2000. 		

18MCAP0419	COMPUTER NETWORKS		Credits: 4
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
Students should be able to understand			
<ul style="list-style-type: none"> • The types of Computer Networks and Models • Working of different layers • Routing and security algorithms 			
LEARNING OUTCOMES:			
Students should be able to explain			
<ul style="list-style-type: none"> • The different types of Computer Networks and Models • Different types of communication media • Working of Data Link layer • Working of Network layer • Transport services and simple security algorithms 			

UNIT	CONTENTS	Lecture Schedule
I	Computer Networks & Models	13
	• Uses of computer networks	3
	• Network hardware	2
	• Network software	2
	• Reference models	2
	• Example networks	2
	• Network standardization	2
II	Communication Media	13
	• Guided transmission media	4
	• Wireless transmission	3
	• Communication satellites	3
III	Data link layer	13
	• Data link layer design issues	3
	• Error detection and correction	2
	• Elementary data link protocols	2
	• Sliding window protocols	3
IV	Network Layer	12
	• Network layer design issues	2
	• Routing algorithms	3
	• Congestion control algorithms	3
	• Quality of service	2
V	Transport Service	13
	• Transport service	5
	• Elements of transport protocols	5
	• Electronic mail	3
Total Contact Hours		64

Text Book:

1. Computer Networks, 4/e, Andrew S.Tanenbaum, Prentice – Hall of India Private Ltd., 2003.

Reference Books:

1. Design and Analysis of Computer Communication Networks, Vijay Ahuja, McGraw– Hill International Ed., 1987.
2. Data Communications, Computer Networks and Open Systems, Fred Halsall, 4/e, Addison– Wesley, 1999.
3. Inside Networks, James K. Hardy, Prentice– Hall of India, 1999.

18MCAP04EX	MAJOR ELECTIVE – II		
Credits	Theory: 4	Practical: 0	Total Credits: 4

18MCAP04EY	MAJOR ELECTIVE – III		
Credits	Theory: 4	Practical: 0	Total Credits: 4

18MCAP04MX	MODULAR COURSE - II		
Credits	Theory: 2	Practical: 0	Total Credits: 2

18MCAP0420	Lab VII: WEB PROGRAMMING		
Credits	Theory: 0	Practical: 1	Total Credits: 1
<ol style="list-style-type: none"> 1. Web page design using HTML Tags <ul style="list-style-type: none"> • Creation – Ordered List, Unordered List, Tables, Frames, Links, Image Anchor, Image Maps • Using Form Controls with Input Tag, Cascading Style Sheets 2. XML <ul style="list-style-type: none"> • Creating XML Document with Internal DTD and External DTD 3. JavaScript <ul style="list-style-type: none"> • Simple Programs in JavaScript Using Control Structures, Arrays, Strings, Objects, Event Handlers, Form Validation 4. PHP <ul style="list-style-type: none"> • Programs on Arrays using PHP Array Functions • Validation of HTML Form Inputs and Processing Using Global Variables • Programs based on PHP and MySQL Database Connectivity 5. Simple Project on Web Designing 			

18MCAP0421	LAB– VIII NETWORKS		
Credits	Theory: 0	Practical: 1	Total Credits: 1
<ol style="list-style-type: none"> 1. Host Identification and Details 2. Ping and Echo Commands 3. Client/ Server Implementation 4. File Transfer 5. Framing Techniques 6. Encoding 7. Multi– Client and Server 8. Error Control 9. Routing Algorithms 10. Encryption Techniques 			

18MCAP0422	MINI PROJECT ON IT FOR RURAL DEVELOPMENT	Credits: 2
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SEMESTER V

16MCAP0523	PYTHON PROGRAMMING		Credits: 4
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
Students should be able to understand <ul style="list-style-type: none"> • To learn about the programming constructs, objects and classes in Python Language • To motivate to develop efficient applications to solve real world problems using Python 			
LEARNING OUTCOMES:			
Students should be able to explain <ul style="list-style-type: none"> • Understand why Python is a useful scripting language for developers • Apply decision and repetition structures in program design • Implement methods and functions to improve readability of programs • Able to develop an efficient applications using python programming 			

UNIT	CONTENTS	Lecture Schedule
I	Introduction	13
	<ul style="list-style-type: none"> • Introduction: IDLE an Interpreter for Python, Python Strings, Relational Operators, Logical Operators, Bitwise Operators, Variables and Assignment Statements, Keywords, Script Mode 	4
	<ul style="list-style-type: none"> • Functions - Built-in Functions, Function Definition and Call, Importing User-defined Module, Assert Statement, Command Line Arguments 	5
	<ul style="list-style-type: none"> • Control Structures - if Conditional Statement, Iteration (for and while Statements) 	4
II	Scopes, Strings and Objects	13
	<ul style="list-style-type: none"> • Scope - Objects and Object ids, Scope of Objects and Names 	4
	<ul style="list-style-type: none"> • Strings - Strings, String Processing Examples, Pattern Matching.. 	4
	<ul style="list-style-type: none"> • Mutable and Immutable Objects – Lists, Sets, Tuples, Dictionary 	5
III	Recursion, Files and Exceptions	13
	<ul style="list-style-type: none"> • Recursion - Recursive Solutions for Problems on Numeric Data, Recursive Solutions for Problems on Strings, Recursive Solutions for Problems on Lists, Problem of Tower of Hanoi 	6
	<ul style="list-style-type: none"> • Files and Exceptions - File Handling, Writing Structures to a File, Errors and Exceptions, Handling Exceptions Using try...except, File Processing Example 	7
	Classes	13

	<ul style="list-style-type: none"> • Classes I - Classes and Objects, Person: An Example of Class, Class as Abstract Data Type, Date Class 	6
	<ul style="list-style-type: none"> • Classes II - Polymorphism, Encapsulation, Data Hiding, and Data Abstraction, Modifier and Accessor Methods, Static Method, Adding Methods Dynamically, Composition, Inheritance, Built-in Functions for Classes 	7
	Graphics and Applications of Python	12
V	<ul style="list-style-type: none"> • Graphics - 2D Graphics, 3D Objects, Animation – Bouncing Ball 	4
	<ul style="list-style-type: none"> • Applications of Python - 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 	8
Total Contact Hours		64

Text Books:

1. Python Programming a Modular Approach with Graphics, Database, Mobile, and Web Applications – Sheetal Taneja, Naveen Kumar – Pearson Publication, 2018.

Reference Books:

1. Python Programming - Reema Thareja, Oxford University Press, 2017
2. Fundamentals of Python Programming, Lambert – Cengage Publications, 2017
3. Problem Solving using Python – E. Balagurusamy, Mc Graw Hill Education Ltd., 2017

18MCAP0524	SOFTWARE ENGINEERING		
Credits	Theory: 4	Practical:0	Total Credits: 4
OBJECTIVES:			
Students should be able to understand <ul style="list-style-type: none"> • The various processes and models in software development • The metrics and estimates of software • Risk management • Various testing techniques and strategies. 			
LEARNING OUTCOMES:			
Students should be able to explain <ul style="list-style-type: none"> • The various processes and models in software development • The metrics and estimates of software • Risk management and review mechanisms • Requirement and design engineering • Various testing techniques and strategies. 			

UNIT	CONTENTS	Lecture Schedule
I	THE PROCESS	12
	• THE PROCESS: Software engineering: A layered technology	2
	• The Software process – Software process models	2
	• The linear sequential model – The prototyping model	2
	• The RAD model – Evolutionary software process models	2
	• Component based development – The formal methods model	2
	• Fourth generation techniques – Process technology	1
	• Product and process	1
II	SOFTWARE PROCESS AND PROJECT METRICS & SOFTWARE PROJECT PLANNING	12
	• SOFTWARE PROCESS AND PROJECT METRICS: Measures, metrics and indicators	1
	• Metrics in the process and project domains – Software measurement	1
	• Reconciling different metrics approaches – Metrics for software quality	1
	• Integrating metrics within the software engineering process	2
	• Managing variation: statistical quality control – Metrics for small organizations	1
	• Establishing a software metrics program	1
	• SOFTWARE PROJECT PLANNING: Observations on estimating	1
	• Project planning objectives – Software scope	1
	• Resources – Software project estimation – Decomposition techniques	1
	• Empirical estimation model – Automated estimation tools	2

	RISK ANALYSIS AND MANAGEMENT & SOFTWARE QUALITY ASSURANCE	12
III	• RISK ANALYSIS AND MANAGEMENT: Software risks	1
	• Risk identification	1
	• Risk projection	1
	• Risk refinement – Risk mitigation, monitoring and management	2
	• SOFTWARE QUALITY ASSURANCE: Quality concepts	2
	• The quality movement – Software quality assurance	2
	• Software reviews – Formal technical reviews	2
	• Software reliability – The ISO 9000 quality standards	1
	SYSTEM ENGINEERING & DESIGN CONCEPTS AND PRINCIPLES	14
IV	• SYSTEM ENGINEERING: Computer based systems	1
	• The system engineering hierarchy	1
	• Business process engineering: an overview	1
	• Product engineering: An overview – Requirements engineering	2
	• System modelling	1
	• DESIGN CONCEPTS AND PRINCIPLES: Software design and software engineering	2
	• The design process – Design principles	2
	• Design concepts – Effective modular design	2
	• Design heuristics for effective modularity	1
	• The design model – Design documentation	1
	SOFTWARE TESTING TECHNIQUES & SOFTWARE TESTING STRATEGIES	14
V	• SOFTWARE TESTING TECHNIQUES: Software testing fundamentals	2
	• Test case design – White-box testing – Basis path testing	2
	• Control structure testing – Black box testing	2
	• Testing for specialized Environments, Architectures and applications	2
	• SOFTWARE TESTING STRATEGIES: A strategic approach to software testing	2
	• Strategic issues – Unit testing	1
	• Integration testing – Validation testing	2
	• System testing – The art of debugging	1
	Total Contact Hours	
Text Book:		
1. Software Engineering – A Practitioner’s Approach, 5/e, Roger S. Pressman, McGraw Hill Inc., 2001		
Reference Books:		
1. Agile Software Development, Alistair Cockburn, 2/e ,Pearson Education, 2007		
2. Software Engineering concepts, Richard E.Fairley, McGraw Hill, 1984.		
3. Software Engineering, 9/e, Ian Sommerville, Addison Wesley, 2011.		

18MCAP05EX	MAJOR ELECTIVE – IV		
Credits	Theory: 4	Practical: 0	Total Credits: 4

18MCAP05EY	MAJOR ELECTIVE – V		
Credits	Theory: 4	Practical: 0	Total Credits: 4

18MCAP05EZ	MAJOR ELECTIVE – VI		
Credits	Theory: 4	Practical: 0	Total Credits: 4

18MCAP0525	LAB IX: PYTHON PROGRAMMING		
Credits	Theory: 0	Practical: 1	Total Credits: 1
Python Programs using <ol style="list-style-type: none"> 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 			

18MCAP0526	LAB X: .NET PROGRAMMING		
Credits	Theory: 0	Practical: 1	Total Credits: 1
ASP.NET <ol style="list-style-type: none"> 1. Creating Web Forms, Controls, Postbacks 2. Working with Web Objects, State Management 3. Validating User Input 4. Creation of Master Pages, Themes and Site Navigation 5. Data Access with ADO.NET 6. Data Component and Dataset 7. Data Binding 8. Error Handling 9. Security 10. Programming XML Documents with ASP.NET 11. Converting and Transforming XML Data with ASP.NET 12. Creating Web Services 			
VB .NET <ol style="list-style-type: none"> 1. Creating Windows Forms 2. Setting and Adding Properties to a Windows Form 3. Implementing Class Library Object, Inheritance 4. Using Application Class and Message Class 5. Event Handling 6. Building graphical Interface Elements 7. Adding Controls 8. Common Controls, Handling Control Events and Dialog Boxes 9. Creating Menu and Menu Items 10. Creating Multiple – Document Interface (MDI) Applications 11. Validation 12. Exceptions 13. Security 14. Data Access with ADO .NET 15. Data Binding 16. Using XML Data with VB.NET 17. Finding and Sorting Data in Datasets 18. Creating Web Services 			

18MCAP0527	MINI PROJECT (MOBILE APPLICATIONS DEVELOPMENT)	Credits: 2
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SEMESTER VI

18MCAP0628 Dissertation and Viva-Voce

ELECTIVES

18MCAP03E1	OPTIMIZATION TECHNIQUES (Derivation of results and proofs of theorems are not expected)		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVE:			
<ul style="list-style-type: none"> • To get the knowledge about mathematical formulation, decision making and optimizing the output of many real life problems 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> • Students will be able to formulate and solve the LPP in their real life • Students will be able to find shortest path to get minimum transportation cost • Students will identify best queuing models and its characteristics. • Inventory theory gives economic orders of quantity in stock of production or sales problems. • PERT & CPM provides to identify critical time and best path of a project to complete in minimum time. 			

UNIT	CONTENTS	Lecture Schedule
I	Introduction	14
	• Mathematical Formulation of the LPP	3
	• Graphical Solutions	3
	• General LPP, Simplex Method	4
	• Big M Method, Phase I and Phase II Simplex Method	4
II	Concept of Duality in L.P.P	13
	• Duality in L.P.P	4
	• Duality and Simplex Method – Dual Simplex Method	3
	• Transportation Problems IBFS by NWC and VAM	3
	• Optimal Solution of TP	3
III	Queuing System	13
	• Queuing System	3
	• Queues Models - (M/M/1) : (∞ /FIFO)	3
	• (M/M/1) : (N/FIFO),	3
	• (M/M/C) : (∞ /FIFO), (M/M/C) : (N/FIFO) models	4
IV	Inventory theory	12
	• Inventory theory	3
	• EOQ Problems with no shortages – with shortages	3
	• Replacement of Items that Deteriorate	3
	• Replacement of Items that Fail Suddenly	3
V	PERT and CPM	12
	• Network and Basic Components	3
	• CPM Calculations	3
	• PERT Calculations	3
	• Advantages of Network	3
Total Contact Hours		64

Text Book:

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

Reference Books:

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

18MCAP04E1	IMAGE PROCESSING		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> To teach the concepts of image processing with suitable illustrations To teach the applications of Image processing concepts and algorithms To motivate the students to learn the research profile of image processing 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> The students will learn the fundamentals and basic concepts of image processing. The students will acquire knowledge on the mechanism of the standard algorithms used for image enhancement. The students will understand the concept of Image Restoration and Image Compression. The students will gain the knowledge of the concept of Image Segmentation and Morphological Operations. The special-interest group students acquire aptitude to design and develop novel algorithms for simple image processing applications. 			

UNIT	CONTENTS	Lecture Schedule
I	Introduction and Digital Image Fundamentals: Introduction	13
	<ul style="list-style-type: none"> What is Digital Image Processing- examples of fields that uses DIP - Fundamental Steps in Digital Image Processing - Components of an Image Processing 	6
	<ul style="list-style-type: none"> Digital Image Fundamentals - 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. 	7
II	Image Enhancement Techniques	13
	<ul style="list-style-type: none"> Background - Some Basic Intensity Transformation Functions - Histogram Processing - Fundamentals of Spatial Filtering - Smoothing Spatial Filters - Sharpening Spatial Filters 	7
	<ul style="list-style-type: none"> Combining Spatial Enhancement Methods - Using Fuzzy Techniques for Intensity Transformations and Spatial Filtering. 	6
III	Image Restoration and Reconstruction	12
	<ul style="list-style-type: none"> Model of the Image Degradation/Restoration process - Noise Models - Noise Only—Spatial Filtering - Periodic Noise Reduction Using FDF - 	6
	<ul style="list-style-type: none"> Inverse Filtering - Minimum Mean Square Error Filtering - Constrained Least Squares Filtering - Geometric Mean Filter - Image Reconstruction from Projections. 	6
IV	Image Compression and Watermarking	13
	<ul style="list-style-type: none"> Fundamentals - Huffman Coding - Arithmetic Coding - LZW Coding - Run-length Coding - Symbol-based Coding - Bit-plane Coding 	7
	<ul style="list-style-type: none"> Block Transform Coding - Predictive Coding - Digital Image Watermarking. 	6

Image Segmentation and Representation		13
V	<ul style="list-style-type: none"> • Morphological Image Processing - Preliminaries - Erosion and Dilation - Some Basic Morphological Algorithms - Morphological Reconstruction - 	5
	<ul style="list-style-type: none"> • Image Segmentation - Fundamentals - Point, Line, and Edge Detection - Thresholding - Segmentation by Region Growing and by Region Splitting and Merging. 	8
Total Contact Hours		64
<p>Text Book:</p> <ol style="list-style-type: none"> 1. Digital Image Processing, Fourth Edition, Rafael C. Gonzalez and Richard E. Woods, Pearson Education, 2018. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Fundamentals of Digital Image Processing, Chris Solomon & Toby Breckon, Wiley – Blackwell publications, 2011. 2. Digital Image Processing and Analysis, B. Chandra and D. Dutta Majumder, PHI, New Delhi, 2006. 3. Fundamentals of Digital Image Processing, Anil K. Jain, Prentice Hall of India, 1989. 4. http://nptel.ac.in/courses/106105032/ 5. https://freevideolectures.com/course/2316/digital-image-processing-iit-kharagpur 		

18MCAP04E4	COMPUTER GRAPHICS		Credits: 4
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVE:			
<ul style="list-style-type: none"> This course helps the students to learn about the creation and manipulation of images with aids of computers and its available hardware and software. This course encourages the students to generate their own computer generated imagery (CGI) applications. 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> Identify the types of graphics monitors, workstations, input devices and input techniques available to work with graphics. Understand the mathematical and heuristic algorithms behind the graphics object generation Familiarize the attributes to control the object shape and antialiasing techniques for accurate display. Understand the forms of 2D transformations, mapping process from world view to display view and clipping process to select the visible portion. construct the algorithms for 3D objects processing and familiarize the 3D scene handling based on view plane direction 			

UNIT	CONTENTS	Lecture Schedule
I	Overview of Graphics Systems	13
	• Overview Of Graphics Systems	1
	• Video Display Devices	2
	• Raster Scan And Random Scan Systems	3
	• Input Devices	1
	• GUI and Interactive Input Methods: Logical Classification of Input Devices	2
	• Input Functions	2
	• Interactive Picture Constructive Techniques.	2
II	Output Primitives	13
	• Output Primitives : Points and Lines – Line Drawing Algorithms – DDA and Bresenham's	4
	• Loading the Frame Buffer – Line Function – Circle Generating Algorithms	4
	• Filled Area Primitives – Fill Area Functions – Cell Array	4
	• Character Generation.	1
III	Attributes of Output Primitives	12
	• Attributes Of Output Primitives : Line Attributes	3
	• Curve Attributes- Colour and Gray Scale	2
	• Area Fill Attributes – Character Attributes	2
	• Bundled Attributes – Inquiry Functions	2
	• Antialiasing	3
	Two Dimensional Geometric Transformations	13
	• Two Dimensional Geometric Transformations: Basic Transformations – Matrix Representation	2
	• Composite Transformations – General Fixed Point – Scaling –	3

IV	Other Transformations	
	• Two Dimensional Viewing : The Viewing Pipeline – Window– To– Viewport Coordinate Transformation —	2
	• Clipping Operations – Point Clipping – Line Clipping – Cohen – Sutherland Line Clipping	3
	• Sutherland – Hodgeman Polygon Clipping – Curve Clipping – Text Clipping	3
V	Three Dimensional Concepts	13
	• Three Dimensional Concepts: Three Dimensional Methods – Three Dimensional Geometric and Modeling Transformations	4
	• Translation – Rotation – Scaling – Other Transformations.	3
	• Visible – Surface Detection Methods – Classification – Depth Buffer Method	1
	• Scan Line Method – Depth Sorting Method	3
	• BSP Tree Method – Area Subdivision Method.	2
Total Contact Hours		64
Text Book:		
1. Computer Graphics C Version, Donald Hearn, M. Pauline Baker, 2/e, Pearson Education, New Delhi, 2005		
Reference Books:		
1. Principles of Interactive Computer Graphics, W.M.Newman and R.F.Sproull, 2/e, Tata McGraw– Hill Publishing Co. Ltd, 1997.		
2. Procedural Elements for Computer Graphics, D.F.Rogers, 2/e, Tata McGraw– Hill Publishing Co. Ltd., 2001.		
3. Computer Graphics, V. Xiang and R.A. Plastock, Schaum’s Outline Series, Tata McGraw– Hill Publishing Co., 2002.		

18MCAP05E1	INFORMATION SECURITY		Credits: 4
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
Students should be able <ul style="list-style-type: none"> • To Understand the basics of Information Security • To Identify Risk and Management of Risks • To become aware of various standards in Security 			
LEARNING OUTCOMES:			
Students should be able to explain <ul style="list-style-type: none"> • The basics of Information Security • Various Security Threats and Attacks • Risk Management • Various standards in Security • The technological aspects of Information Security 			

UNIT	CONTENTS	Lecture Schedule
I	Introduction	13
	• Introduction: History, What is Information Security?	2
	• Critical Characteristics of Information	2
	• NSTISSC Security Model	2
	• Components of an Information System	2
	• Balancing Security and Access	2
	• The SDLC, The Security SDLC	3
II	Security Investigation	12
	• Security Investigation: Need for Security	2
	• Business Needs	2
	• Threats	2
	• Attacks	2
	• Secure Software Development	2
	• Laws and Ethics in Information security	1
• Ethics in Information security	1	
III	Security Analysis	13
	• Risk Management: Identifying and Assessing Risk	4
	• Controlling Risk	4
	• Quantitative versus Qualitative Risk control practices	2
	• Risk management discussion points	3
IV	Logical Design	13
	• Information security planning and Governance	2
	• Information Security Policy	2
	• Standards and Practices	2
	• The Information Security Blueprint	2
	• Security Education, Training and Awareness program	2

	• Continuity Strategies	3
	Physical Design	13
V	• Intrusion Detection and Prevention Systems	2
	• Scanning and Analysis Tools	2
	• Cipher Methods	2
	• Cryptographic Algorithms	2
	• Cryptographic Tools	2
	• Attacks on Cryptosystems	2
	• Physical Access Controls	1
Total contact Hours		64

Text Book:

1. Principles of Information Security, Michael E Whitman and Herbert J Mattord, vVikas Publishing House, New Delhi, 2003

Reference Books

1. Handbook of Information Security Management, Micki Krause, Harold F. Tipton, Vol 1– 3 CRC Press LLC, 2004.
2. Hacking Exposed, Stuart Mc Clure, Joel Scrambray, George Kurtz, Tata McGraw– Hill, 2003.
3. Computer Security Art and Science, Matt Bishop, Pearson/Prentice Hall of India, 2002.

18MCAP05E2	MOBILE COMMUNICATIONS		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> • This course supports the students to learn about the importance of mobile devices and merits of its communication strategies in present scenario. • This course encourages the students to develop smart phone applications for mobile communications. 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> • To familiarize 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. • To understand 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. • To identify the types of wireless LAN architecture and protocols. • To learn the structure, features and transmission techniques of mobile IP. • To learn the coding using WML script, an up gradation of HTML and XML for mobile applications 			

UNIT	CONTENTS	Lecture Schedule
I	Introduction	13
	• Introduction: Need for Mobile Computing, Mobile and Wireless Devices,	2
	• Simplified Reference Model.	1
	• Wireless Transmission: Frequencies, Signals	2
	• Antennas, Signal propagation	2
	• Multiplexing	1
	• Spread Spectrum and Cellular Systems.	2
II	• Medium Access Control: SDMA, FDMA, TDMA, CDMA, Comparisons.	3
	Telecommunication System	13
	• Telecommunication System: GSM – Services, Architecture, Interface, Protocols, Localization, Calling, Handover and Security	5
	• UMTS and IMT 2000 – Standardization, Architecture, Interface, Network, Handover.	4
	• Satellite System: History, Applications, Basics	2
• Routing, Localization, Handover.	2	
III	Wireless LAN	13
	• Wireless Lan : IEEE 802.11 – Architecture,	3
	• Physical Layer, MAC Layer	4
	• HIPERLAN 1	2
	• Bluetooth – Architecture, Link Management and Security.	4
	Mobile Network Layer	13

	• Mobile Network Layer: Mobile IP – Goals	2
	• Packet Delivery Strategies	3
	• Registration, Tunneling and Reverse Tunneling,	3
	• Mobile Ad-hoc Networks	1
	• Routing Strategies.	4
	Wireless Application Protocol	12
V	• Wireless Application Protocol: Architecture	2
	• Protocols	4
	• WML	2
	• WML Script Applications.	4
Total Contact Hours		64

Text Books:

2. Mobile Communication, 2/e, Jochen Schiller, Pearson Education, Delhi 2008.
3. The Wireless Application Protocol – Singhal Sandeep and Bridgm Thomas, Pearson Education, India, 2001.

Reference Books:

1. Wireless Application Protocol: “Writing Applications for the Mobile internet”, Sandeep Signal et al.

18MCAP05E4	ORGANIZATIONAL BEHAVIOUR		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> To help students understand organizational behaviour and management practices by examining psychological principles To facilitate a critical evaluation of organizational practices and their impact on work behaviours, attitudes and performance 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> Understand the importance of Organizational Behaviour (OB) and various OB models Identify the factors that influence a person's personality and their impact on work behaviour Have a clear idea on the organization structure and Group Dynamics Evaluate the potential effectiveness of leadership styles within a specific organizational context Assess complexity and uncertainty in organizations and apply organizational behaviour concepts to managing behaviours in the workplace. 			

UNIT	CONTENTS	Lecture Schedule
I	Importance of Organizational Behaviour	12
	• Definition-Contributing Fields to Organizational Behaviour- Behaviour model for organizational efficiency	3
	• Organizational Components that need to be managed-Foundation of Individual Behaviour – Biographical Characteristics	3
	• Framework of Emotional Competence	2
	• Learned Characteristics-Developing an Organizational Behaviour model (OB Model)	2
	• Types of models of Organizational. Behaviour model- Environmental Factors	2
II	Factors Influencing Personality	12
	• Determinants of Personality-Personality Traits	1
	• The Myers-Briggs Type Indicator(MBTI)-Locus of control	2
	• Personality orientation-Achievement orientation-Authoritarianism	3
	• Theory of Machiavellianism-Self-Esteem-Self Monitoring-Risk Taking	3
	• Types of personality-Studies indicating personality traits of Indian Managers	3
III	Organization Structure	14
	• Definition-Forms of Organization Structure-Organic form of Organizational structure	3
	• Bureaucracy-Concepts of Organizational structure-Centralization and decentralization-	3
	• Formalization-Standardization-Specialization-Stratification-	3
	• Formal Organization -Informal Organization -Span of Management	3
	• Designing of Organizational Structure -Types of Organizational Structure	2

	Leadership Styles	12
IV	• Introduction-Ingredients of Leadership- Theories of Leadership - Trait Theory of Leadership	3
	• Leadership styles based on authority- Managerial Grid	3
	• Contingency approach to leadership-Hersey and Blanchard's situational leadership model- Behavioral approach	3
	• Fiedler's contingency approach-Path-Goal theory of leadership-charismatic leadership-Transformational leadership	3
	Organizational Development and Culture	14
V	• Quality of work life- Sensitivity Training- Transactional Analysis	3
	• Process Consultation- Third party peacemaking interventions	2
	• Individual counseling- career planning-Job Related Interventions-	3
	• Socio-Technical Interventions-Structural Interventions-Learning Organization	3
	• Functions of Organizational Culture – Levels of Culture	2
	• Management Philosophy-Organizational Climate	1
Total Contact Hours		64
Text Books:		
1. Organizational Behaviour, V G Kondalkar, New Age Publishing House, First Edition, 2018.		
2. Organisational Behaviour, Stephen P. Robins, 11/e, PHI Learning / Pearson Education, 2008.		
3. Organisational Behaviour, Fred Luthans, 11/e, McGraw Hill, 2001.		
Reference Books:		
1. Organisational Behaviour, Schermerhorn, Hunt and Osborn, 9/e, John Wiley, 2008.		
2. Understanding Organisational Behaviour, Udai Pareek, 2/e, Oxford Higher Education, 2004.		
3. Organisational Behaviour, Mc Shane & Von Glinov,4/e , Tata Mc Graw Hill, 2007.		

18MCAP05E7	DATA MINING		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> To educate the students on the concepts of database technology evolutionary path which has led to the need for data mining and its applications To teach the basic concepts of Data Warehousing and its Architecture To teach the basic algorithms and techniques used in data mining 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> Compare and contrast Data Mining and Traditional DBMS and major issues in Data mining Understand the Data Warehouse architecture and apply On-line Analytical Processing (OLAP) operations for manipulating data cube, a multidimensional view of data and have a clear idea about the fundamental algorithms and techniques used in mining association rules. Illustrate the use of decision tree induction algorithm for mining classification rules and methods used for Prediction. Explain the various clustering methods used in Cluster Analysis Gain insight into the various applications and current research areas in data mining, such as Web mining, Sequential Pattern Mining and Text mining 			

UNIT	CONTENTS	Lecture Schedule
I	Introduction	12
	<ul style="list-style-type: none"> Introduction: What is Data Mining-On What Kind of Data-Data Mining functionalities-Classification of Data Mining Systems 	6
	<ul style="list-style-type: none"> Integration of a Data Mining System with a Database or Data Warehouse system-Major issues in data mining. 	6
II	Data Warehouse and OLAP Technology for Data Mining	14
	<ul style="list-style-type: none"> Data Warehouse and OLAP Technology for Data Mining: What is a Data Warehouse? -Multidimensional data model -Data Warehouse Architecture. 	7
	<ul style="list-style-type: none"> Association Rule Mining: The Apriori Algorithm-Generating association Rules from Frequent Itemsets -Improving the efficiency of Apriori-Mining Frequent Itemsets without Candidate Generation 	7
III	Classification and Prediction	12
	<ul style="list-style-type: none"> Classification and Prediction: What is Classification? -What is Prediction?-Comparing Classification and Prediction Methods 	4
	<ul style="list-style-type: none"> Classification: Decision Tree Induction-Attribute Selection Measures 	6
	<ul style="list-style-type: none"> Prediction: Linear regression -Non-Linear Regression 	2
IV	Cluster Analysis	13
	<ul style="list-style-type: none"> Cluster Analysis: What is Cluster Analysis? -Types of Data in Cluster Analysis 	4
	<ul style="list-style-type: none"> A Categorization of Major Clustering Methods: Partitioning Methods: K-means,CLARA,CLARANS, K-Medoids. 	5

	<ul style="list-style-type: none"> Hierarchical Methods: BIRCH, ROCK Density based Methods :DBSCAN Grid based Method : STING 	4
V	Mining Multimedia Databases	13
	<ul style="list-style-type: none"> Mining Multimedia Databases: Similarity Search in Multimedia Data, Sequential Pattern Mining 	5
	<ul style="list-style-type: none"> Text mining: Keyword-Based Association and Document Classification 	4
	<ul style="list-style-type: none"> Mining the Worldwide Web: Mining the Web's Link Structures to Identify Authoritative Web Pages -Web Usage Mining 	4
Total Contact Hours		64
<p>Text Book:</p> <ol style="list-style-type: none"> Data Mining Concepts and Techniques, 2/e, Jiawei Han, Micheline Kamber, Morgan Kaufman Publisher(Elsevier), 2006. <p>Reference Books:</p> <ol style="list-style-type: none"> Data Mining Techniques, Arun K Pujari, Universities Press (India) Private Limited, 2001. Insight into Data Mining Theory and Practice, K.P. Soman , Shyam Diwakar, V.Ajay, Prentice Hall of India Pvt. Ltd – New Delhi, 2006. 		

18MCAP05E8	ARTIFICIAL INTELLIGENCE AND DEEP LEARNING		
Credits	Theory: 4	Practical: 0	Total Credits: 4
OBJECTIVES:			
<ul style="list-style-type: none"> • To make the students understand the basic concepts of Artificial Intelligence. • Learn the methods of solving problems using Artificial Intelligence. • Introduce the concepts of Deep Learning 			
LEARNING OUTCOMES:			
<p>At the end of the course, the student should be able to:</p> <ul style="list-style-type: none"> • Identify problems that can be solved by AI methods. • Identify appropriate AI methods to solve a given problem. • Formalise a given problem in the language/framework of different AI methods • Choose and apply appropriate deep learning technique for finding solutions of learning problems 			

UNIT	COURSE CONTENT	Lecture Schedule
I	INTRODUCTION TO AI	13
	Introduction to AI- Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system	5
	Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction	4
	Related algorithms, Measure of performance and analysis of search algorithms.	4
II	REPRESENTATION OF KNOWLEDGE	13
	Game playing - Knowledge representation, Knowledge representation using Predicate logic	5
	Introduction to predicate calculus, Resolution, Use of predicate calculus	4
	Knowledge representation using other logic-Structured representation of knowledge	4
III	KNOWLEDGE INFERENCE	12
	Knowledge representation -Production based system, Frame based system.	4
	Inference - Backward chaining, Forward chaining, Rule value approach	4
	Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.	4
IV	BASICS OF DEEP LEARNING	14
	Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic	7
	Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm.	7

	FEED FORWARD NETWORKS	12
V	Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, autoencoders	6
	Deep Neural Networks: Difficulty of training deep neural networks, Greedy layerwise training.	6
		64

Text Books:

1. Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, McGraw Hill, 2008 (Units- I,II)
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III).
3. Ian Goodfellow, Yoshua Bengio and Aaron Courville, “Deep Learning”, MIT Press, 2016.(Units IV & V)

Reference Books:

1. Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007.
2. Deepak Khemani “Artificial Intelligence”, Tata Mc Graw Hill Education 2013.
3. Raúl Rojas, "Neural Networks: A Systematic Introduction", Springer,1996
4. Christopher Bishop, "Pattern Recognition and Machine Learning", Springer,2006

E-Resources

1. <http://nptel.ac.in>

MODULAR COURSE

18MCAP03M1	ADVANCED COMPUTING TECHNOLOGIES FOR RURAL APPLICATIONS		
Credits	Theory: 2	Practical: 0	Total Credits: 2
OBJECTIVES:			
<ul style="list-style-type: none"> • To provide a basic overview of Advanced Computing Technologies • To investigate the different types of Informatics and their rural applications 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> • Understand the basic concepts of Grid Computing • Gain knowledge on the implementation and applications of Cloud Computing • Have a clear insight into Ubiquitous Computing • Explore how ICT can support and improve management of Health care, Education Agriculture, Public Governance and Rural decision-making. 			

UNIT	CONTENTS	Lecture Schedule
I	Grid Computing	7
	• Introduction to Grid Computing, Anatomy and Physiology of Grid	2
	• Early Grid Activities	1
	• Current Grid Activities	1
	• Grid Standards	1
	• Grid Challenges and Application area	1
	• Grid Computing Organization, roles	1
II	Cloud Computing	8
	• Cloud Computing Overview, History, Key Terms and Definitions	2
	• Applications, Intranets and the Cloud	1
	• Cloud Today, Cloud Computing Services	1
	• On Demand Computing, Discovering Cloud Services	1
	• Software engineering fundamentals for Cloud Computing	1
	• Development Services and Tools	2
III	Ubiquitous Computing	7
	• Ubiquitous Computing: Introduction - Basics	2
	• Applications and Requirements	1
	• Smart Devices and Services	1
	• Smart Mobiles	1
	• Cards and Device Networks	2
IV	Informatics and Rural Applications	8
	• Informatics and Rural Applications: Informatics: Health	2
	• Agriculture	2
	• Education	1
	• Governance	1

	• Finance and other services Rural applications	2
Total Contact Hours		30
Text Books		
<ol style="list-style-type: none"> 1. Grid Computing, Joshy Joseph, Craig Fellenstein, IBM Press, Pearson Education, 2004. 2. Cloud Computing: Web based Applications that change the way you work and Collaborate Online, Michael Miller, Que Publishing, 2008. 3. Ubiquitous Computing Fundamentals, John Krumm, CRC Press, 2010 		
Reference Books:		
<ol style="list-style-type: none"> 1. Agricultural and Environmental Informatics, Governance and Management: Emerging Research Applications, Zacharoula Andreopoulou , Basil Manos, Nico Polman and Davide Viaggi. IGI GLOBAL, June 2011 2. Health Informatics: Practical Guide for Healthcare and Information Technology Professionals , <u>Robert E. Hoyt</u> , <u>Ann K. Yoshihashi</u>, lulu.com, Feb 2014 		

18MCAP03M2	COMPUTER ANIMATION		
Credits	Theory: 2	Practical: 0	Total Credits: 2
OBJECTIVES:			
<ul style="list-style-type: none"> To train the students on Computer Animation Techniques To develop a skill on developing different types of animation. 			
LEARNING OUTCOMES:			
<ul style="list-style-type: none"> Understand the basics of Animation Gain proficiency in developing animation using Flash Familiarize the Action scripts and Event Handling. Develop 3D-animations Design and develop animated movies 			

UNIT	CONTENTS	Lecture Schedule
I	Animation	7
	• Basics of Animation — Need for Animation -Uses of Animation	2
	• Types of Animation	1
	• Principles of Animation – Some Techniques of Animation –	2
	• Animation on the WEB – 3D Animation – Special Effects	1
	• Introduction to Creating Animation.	1
II	Creating Animation in Flash and Actionscript Fundamentals	9
	• Introduction to Flash Animation	1
	• Working with the Timeline and Frame-based Animation	1
	• Working with the Timeline and Tween-based Animation	1
	• Understanding Layers	1
	• Actionscript Fundamentals :Declaring variables –Data type and its conversion- Operators and expressions	2
	• Statements: Types of statements-Syntax-Blocks	1
	• Conditional statements – Loop statements- Functions	2
III	Events and Event Handling	8
	• Types of events –Event handling techniques	1
	• Event handler properties	2
	• Listener Events-on() and onClipEvent() handlers-	2
	• Introduction of objects and classes	1
	• Movie Clips: Types of Movie Clips- Creating Movie Clips.	2
IV	3D Animation	8
	• 3D Animation & its Concepts – Types of 3D Animation	2
	• Skeleton & Kinetic 3D Animation	1
	• Texturing & Lighting of 3D Animation	1
	• 3D Camera Tracking	2
	• Applications & Software of 3D Animation.	2
Total Contact Hours		32

Reference Books:

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

18MCAP04M1	CYBER SECURITY AND IT ACT		
Credits	Theory: 2	Practical: 0	Total Credits: 2
OBJECTIVES:			
<ul style="list-style-type: none"> To know the different types attacks against computers networks To enable the students to understand about Computer and Network Forensic To understand IT Act against cyber crimes 			
LEARNING OUTCOMES:			
At the end of this course, the students will able to			
<ul style="list-style-type: none"> Learn the Network security Technologies Know the Computer and Network forensics Know the different IT acts and amendments 			
UNIT	CONTENTS		Lecture Schedule
I	Network Security		7
	• Network Security: Concepts-Applications-Goals		3
	• Network security Technology: Perimeter Technology-Monitoring Technology-Encryption Technology		4
II	Cyber Security and Hackers		8
	• Cyber crime: Reasons, Methods ,Prevention, Investigation, Agencies for Investigation- Hackers-Cyber security fundamentals-		4
	• Cyber security Architecture principles- Cyber Law- Cyber security policy-Strategies for cyber security		4
III	Computer and Network Forensic		7
	• Computer Security-Introduction-Computer Forensics: Introduction- History of Computer Forensics, Elements, and Investigative procedures		3
	• Analysis of Evidence- Network Forensics: Intrusion Analysis, Damage Assessment, and Forensics Tools		4
IV	IT Act		8
	Evolution of the IT Act- Salient features of the IT Act 2000-Intellectual Property Rights		4
	Different Acts- IT Act in India-Amendments in IT Act-Offence and Penalty		4
Total Contact Hours			30
References:			
<ol style="list-style-type: none"> Eric Maiwald , Network Security,3rd Edition, TMG, 2013 Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security , 2nd Edition, PHI 2002. John W.Rittinghouse, William M.Hancock,Cybersecurity operations Handbook, Elsevier Digital Press, 2003. Joseph Migga Kizza, Computer Network security, Springer International Edition, 2010. Prashant Mali,Cyber Law & Cyber Crimes; Snow White publications, Mumbai Farooq Ahmad, Cyber Law in India, Pioneer Books Vakul Sharma, Information Technology Law and Practice; Universal Law Publishing Co. Pvt. Ltd. https://www.tutorialspoint.com 			
