

CURRICULUM AND SYLLABI FOR
MASTER OF COMPUTER APPLICATIONS
(For the students joining in 2015 - 2016 and afterwards)



Department of Computer Science and Applications
Gandhigram Rural Institute - Deemed University
Gandhigram - 624 302
Dindigul District
Tamil Nadu

THE GANDHIGRAM RURAL INSTITUTE - DEEMED 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 2015– 2016 and afterwards)

Code No.	Subject	Credits	Lecture Hrs/ Week	Lab Hrs/ Week	Evaluation		Total
					CFA	ESE	
SEMESTER – I							
15MCAP0101	Programming in C	4	4	-	40	60	100
15MCAP0102	Computer Organization	4	4	-	40	60	100
15MCAP0103	Software Engineering	4	4	-	40	60	100
15MCAP0104	Mathematical Foundation of Computer Science	4	4	-	40	60	100
15COPP01A1	Accounting and Financial Statement Analysis	4	4	-	40	60	100
15MCAP0105	Lab – I : C Programming	1	-	3	60	40	100
15MCAP0106	Lab – II: Multimedia	1	-	3	60	40	100
15GTPP0001	Gandhi in Everyday Life	-	2	-	50	-	50
15MCAP01F1	Extension / Field Visit	-	-	2	50	-	50
Total Credits		22					
SEMESTER – II							
15MCAP0207	Principles of Operating Systems	4	4	-	40	60	100
15MCAP0208	Data and File Structures	4	4	-	40	60	100
15MCAP0209	Object Oriented Programming in C++	4	4	-	40	60	100
15MCAP0210	Microprocessors and Applications	4	4	-	40	60	100
15MATP02A1	Numerical and Statistical Methods	4	4	-	40	60	100
15MCAP0211	Lab – III : C++ Programming	1	-	3	60	40	100
15MCAP0212	Lab – IV : Shell Programming & ALP	1	-	3	60	40	100
15MCAP02MX	Modular Course - I	2	2	-	50	-	50
15ENGP00C1	Communication and Soft Skills	-	2	-	50	-	50
Total Credits		24					
SEMESTER – III							
15MCAP0313	Database Management Systems	4	4	-	40	60	100
15MCAP0314	Design and Analysis of Algorithms	4	4	-	40	60	100
15MCAP0315	Visual Programming	4	4	-	40	60	100
15MCAP03EX	Major Elective – I	4	4	-	40	60	100
15MCAP03MX	Modular Course – II	2	2	-	50	-	50
15MCAP0316	Lab – V : GUI & RDBMS	1	-	3	60	40	100
15MCAP0317	Lab – VI: Data Structures and Algorithms in C++	1	-	3	60	40	100
15MCAP0318	Mini Project on IT for Rural Development	2	-	-	50	-	50
15EXNP03V1	Village Placement Programme	2	-	-	50	-	50

Total Credits		24					
Code No.	Subject	Credits	Lecture Hrs/Week	Lab Hrs/Week	Evaluation		Total
					CFA	ESE	
SEMESTER – IV							
15MCAP0419	Java Programming	4	4	-	40	60	100
15MCAP0420	Computer Networks	4	4	-	40	60	100
15MCAP04EX	Major Elective - II	4	4	-	40	60	100
15MCAP04EY	Major Elective – III	4	4	-	40	60	100
15MCAP04EZ	Major Elective – IV	4	4	-	40	60	100
15MCAP0421	Lab – VII : Java Programming	1	-	3	60	40	100
15MCAP0422	Lab – VIII: Networks Lab	1	-	3	60	40	100
15MCAP04F2	Extension / Field Visit	-	-	2	50	-	50
Total Credits		22					
SEMESTER – V							
15MCAP0523	Web Programming	4	4	-	40	60	100
15MCAP0524	Mobile Communications	4	4	-	40	60	100
15MCAP05EX	Major Elective – V	4	4	-	40	60	100
15MCAP05EY	Major Elective – VI	4	4	-	40	60	100
15MCAP05EZ	Major Elective – VII	4	4	-	40	60	100
15MCAP0525	Lab – IX: Web Programming	1	-	3	60	40	100
15MCAP0526	Lab – X : .Net Programming	1	-	3	60	40	100
15MCAP0527	Mini Project (Mobile Applications)	2	-	-	50	-	50
Total Credits		24					
SEMESTER – VI							
15MCAP0628	Dissertation **	12	-	-	75	75+50	200
Total Credits for MCA Programme		128					

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 (15MCAP03EX)

- 15MCAP03E1 Optimization Techniques
- 15MCAP03E2 Graph Theory*
- 15MCAP03E3 Linear Programming*

Major Elective –II (15MCAP04EX)

- 15MCAP04E1 Image Processing
- 15MCAP04E2 Bio Informatics*
- 15MCAP04E3 Artificial Intelligence and Expert System*

Major Elective –III (15MCAP04EY)

- 15MCAP04E4 Computer Graphics
- 15MCAP04E5 Service Oriented Architecture*
- 15MCAP04E6 Embedded Systems*

Major Elective –IV (15MCAP04EZ)

- 15MCAP04E7 Principles of Compiler Design
- 15MCAP04E8 Automata Theory and Formal Systems*
- 15MCAP04E9 System Programming*

Major Elective –V (15MCAP05EX)

- 15MCAP05E1 Information Security
- 15MCAP05E2 Neural Networks*
- 15MCAP05E3 Wireless Sensor Networks*

Major Elective –VI (15MCAP05EY)

- 15MCAP05E4 Organizational Behaviour
- 15MCAP05E5 Wireless Sensor Networks*
- 15MCAP05E6 Multicore Architecture*

Major Elective –VII (15MCAP05EZ)

- 15MCAP05E7 Data Mining
- 15MCAP05E8 Pattern Recognition*
- 15MCAP05E9 Knowledge Based System*

List of Modular Courses

Modular Course – I (15MCAP02MX)

- 15MCAP02M1 Computer Animation*
- 15MCAP02M2 Network Administration*
- 15MCAP02M3 Computer Aided Design*

Modular Course – II (15MCAP03MX)

- 15MCAP03M1 Advanced Computing Techniques for Rural Applications
- 15MCAP03M2 Computer Hardware and Troubleshooting*
- 15MCAP03M3 Accounting Software*

* Syllabus under preparation

SEMESTER I

15MCAP0101	PROGRAMMING IN C	Credits: 4
<u>OBJECTIVES:</u> <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 		

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	13
	Mathematical Functions – sin – cos – tan – asin – acos – atan – sqrt – pow – log	3
	String Functions – strcpy – strcat – strcmp – 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.		

References:

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 2006.
2. Understanding Pointers in C, Yashavant Kanetkar, 4/e ,BPB Publications, 2008.

LEARNING OUTCOMES

- 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

15MCAP0102**COMPUTER ORGANISATION****Credits: 4****OBJECTIVE:**

- This course imparts knowledge on the basics of designing a computer system and their working principles, using logic circuits.

UNIT	CONTENTS	Lecture Schedule
I	Digital Logic Circuits, Components and Data Representation	15
	• 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
II	Register Transfer and Micro Operations & Basic Computer Organisation and Design	11
	• 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
III	Central Processing Unit	13
	• 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
IV	Input–Output Organisation	12
	• 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

V	Memory Organisation	13
	• 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: <ol style="list-style-type: none"> 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. References: <ol style="list-style-type: none"> Computer Architecture and Organisation, J.P.Hayes, Tata McGraw–Hill, 1993. Computer Organisation, Hamachar V.C., Vanesic Z.G., Zaky S.G., Tata McGraw–Hill, 1978. 		

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

15MCAP0103	SOFTWARE ENGINEERING	Credits: 4
<u>OBJECTIVES:</u> 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. 		

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
III	RISK ANALYSIS AND MANAGEMENT & SOFTWARE QUALITY ASSURANCE	12
	• 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

	<ul style="list-style-type: none"> • Software reviews – Formal technical reviews 	2
	<ul style="list-style-type: none"> • Software reliability – The ISO 9000 quality standards 	1
IV	SYSTEM ENGINEERING & DESIGN CONCEPTS AND PRINCIPLES	14
	<ul style="list-style-type: none"> • SYSTEM ENGINEERING: Computer based systems 	1
	<ul style="list-style-type: none"> • The system engineering hierarchy 	1
	<ul style="list-style-type: none"> • Business process engineering: an overview 	1
	<ul style="list-style-type: none"> • Product engineering: An overview – Requirements engineering 	2
	<ul style="list-style-type: none"> • System modelling 	1
	<ul style="list-style-type: none"> • DESIGN CONCEPTS AND PRINCIPLES: Software design and software engineering 	2
	<ul style="list-style-type: none"> • The design process – Design principles 	2
	<ul style="list-style-type: none"> • Design concepts – Effective modular design 	2
	<ul style="list-style-type: none"> • Design heuristics for effective modularity 	1
	<ul style="list-style-type: none"> • The design model – Design documentation 	1
V	SOFTWARE TESTING TECHNIQUES & SOFTWARE TESTING STRATEGIES	14
	<ul style="list-style-type: none"> • SOFTWARE TESTING TECHNIQUES: Software testing fundamentals 	2
	<ul style="list-style-type: none"> • Test case design – White-box testing – Basis path testing 	2
	<ul style="list-style-type: none"> • Control structure testing – Black box testing 	2
	<ul style="list-style-type: none"> • Testing for specialized Environments, Architectures and applications 	2
	<ul style="list-style-type: none"> • SOFTWARE TESTING STRATEGIES: A strategic approach to software testing 	2
	<ul style="list-style-type: none"> • Strategic issues – Unit testing 	1
	<ul style="list-style-type: none"> • Integration testing – Validation testing 	2
	<ul style="list-style-type: none"> • System testing – The art of debugging 	1
Total Contact Hours		64
Text Book: <ol style="list-style-type: none"> 1. Software Engineering – A Practitioner’s Approach, 5/e, Roger S. Pressman, McGraw Hill Inc., 2001 References: <ol style="list-style-type: none"> 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. 		

LEARNING OUTCOMES

Students should be able to explain

- 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.

15MCAP0104	MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	Credits: 4
<u>OBJECTIVES:</u> <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 		

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
	• Characteristic Function of a Set, Hashing Functions	3
	• Natural Numbers - Peano's Axioms and Mathematical Induction	3
IV	Matrices	13
	• Matrices: Matrix Operations - Rules of Matrix Arithmetic -	4
	• Eigen Values and Eigen Vectors	3
	• Diagonalization Theorem (Problem only, No Proof) and Rank	3
	• Cayley Hamilton theorem- Problems	3
V	Graph Theory	14
	• Graph as Models – Vertex degrees Subgraph – Path	4
	• Cycle - Matrix Representation of graphs- Fusion – Trees & Connectivity	4
	• Bridges – Spanning Trees – Connector Problem	3
	• Kruskal's Algorithm – Priori'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)

References:

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.

LEARNING OUTCOMES

- 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.

15COPP01A1	ACCOUNTING AND FINANCIAL STATEMENT ANALYSIS	Credits: 4
<u>OBJECTIVE:</u> <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? 		

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
		12

V	Cost Accounting	
	• 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
References: <ol style="list-style-type: none"> 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. 		

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

15MCAP0105	LAB - I: C PROGRAMMING	Credit: 1
I. C Programs with <ol style="list-style-type: none"> 1. Control Structures: while, do...while, for, if...else, switch, continue, break 2. Array Handling: Single dimensional, Multidimensional 3. Pointers 4. Functions: Simple and Recursive Functions, Functions and Pointers 5. File Handling 6. Simple Graphics 		

15MCAP0106	LAB– II: MULTIMEDIA	Credit: 1
Simple programs using FLASH <ol style="list-style-type: none"> 1. Tools and workspace utilization 2. Animation 3. Graphics effects 4. Text effects 5. Importing Audio and Video 6. Action Script 7. Publishing Flash content 8. Mini project (Team Work) 		
Case Study: <ol style="list-style-type: none"> 1. Photoshop [Images] 2. Cool 3D [Text] 3. Audacity [Sound] 4. Power Director Pro, Video Cutter [Video] 		

15GTPP0001	GANDHI IN EVERYDAY LIFE
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15MCAP01F1	EXTENSION/FIELD VISIT
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SEMESTER II

15MCAP0207	PRINCIPLES OF OPERATING SYSTEMS	Credits: 4
<u>OBJECTIVES:</u> <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 		

UNIT	CONTENTS	Lecture Schedule
I	Introduction	12
	• Introduction: What is OS?	1
	• Mainframe Systems, Desktop Systems	1
	• Multiprocessor Systems	1
	• Distributed Systems	1
	• Clustered Systems	1
	• Real-Time Systems	1
	• Handheld Systems	1
	• Feature Migration and Computer Environments.	1
	• Computer-System Structures: Computer-System Operation	1
	• I/O Structure	1
	• Storage Structure, Storage Hierarchy	1
	• Hardware Protection and Network Structure	1
II	Operating System Structures	12
	• Operating-System Structures: System Components	2
	• Operating System Services	2
	• System Calls, System Programs	2
	• System Structures	2
	• Virtual Machines	2
	• System Design and Implementation, System Generation.	2
III	Processes	13
	• Processes: Concept	2
	• Scheduling, Operations	1
	• Cooperating Processes	2
	• Interprocess Communication	2
	• Communication in Client- Server Systems.	2
	• Threads: Overview	2
	• Multithreading Models and Threading Issues.	2
	CPU Scheduling	13
	• CPU Scheduling: Basic Concepts	2
	• Scheduling Criteria	1
	• Scheduling Algorithms	1
	• Multiple Processor Scheduling	1

IV	• Real Time Scheduling	1
	• Algorithm Evaluation and Process Scheduling Models.	1
	• Deadlocks: System Model	1
	• Deadlock Characterization	1
	• Methods for Handling Deadlocks	1
	• Deadlock Prevention	1
	• Deadlock Avoidance	1
	• Deadlock Detection and Recovery from Deadlock.	1
V	Memory Management	14
	• Memory Management: Background	2
	• Swapping	1
	• Contiguous Memory Allocation	1
	• Paging	1
	• Segmentation	1
	• Segmentation with Paging.	2
	• Virtual Memory: Background	1
	• Demand Paging	1
	• Process Creation	1
	• Page Replacement	1
	• Allocation of Frames and Thrashing.	1
	• Introduction to Mobile Operating Systems.	1
Total Contact Hours		64
Text Book: <ol style="list-style-type: none"> 1. Operating System Concepts, 6/e, Silberschatz & Galvin, Addison– Wesley Publishing Company, 2003. References: <ol style="list-style-type: none"> 1. Operating System Design and Implementation, Andreaw S. Tanenbaum and Albert S. Woodhull, Prentice Hall, 2006. 2. Operating Systems, H M Deital, P J Deital and D R Choffnes, 3/e, Pearson Education, 2011. 3. Smartphone Operating System Concepts with Symbian OS: A Tutorial Guide, Michael J. Jipping, 2007. 		

LEARNING OUTCOMES

At the end of the course students will be able to:

- 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

15MCAP0208	DATA AND FILE STRUCTURES	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 		

UNIT	CONTENTS	Lecture Schedule
I	Arrays	12
	<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
II	Linked Lists	12
	<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
III	Stacks and Queues	14
	<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
IV	Trees and Hash Tables	13
	<ul style="list-style-type: none"> Trees and Hash Tables: Definition and Concepts - Representations of binary tree -Operations on a binary tree 	6
	<ul style="list-style-type: none"> Binary tree traversal -Types of Binary trees -Trees and Forests 	4
	<ul style="list-style-type: none"> Hash Tables 	3
V	File Structures	13
	<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 Commands 	5
	<ul style="list-style-type: none"> Field and Record Organization: Field structures, Record structures-Indexed Sequential Access 	4
	<ul style="list-style-type: none"> 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.

References:

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. Tanenbaum, 2/e, PHI, 1999
3. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, AWL publications, 1994.

LEARNING OUTCOMES

- 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

15MCAP0209	OBJECT ORIENTED PROGRAMMING IN C++	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 		

UNIT	CONTENTS	Lecture Schedule
I	Principles of Object–Oriented Programming	13
	• Principles of Object–Oriented Programming : Basic Concepts of Object– Oriented Programming - Benefits	4
	• Object–Oriented Languages – Applications of OOP	2
	• Beginning with C++ – Tokens	3
	• Expressions and Control Structures	4
II	Functions & Classes and Objects	13
	• Functions in C++	2
	• Classes and Objects – Specifying a Class – Declaring Objects – Defining Member Functions	4
	• Static Data Members and Member Functions – Array of Objects -Friendly functions –const Member Functions, Data Members and Objects	4
	• Constructors – Constructor Types, Destructors.	3
III	Operator Overloading and Inheritance	13
	• Operator Overloading and Inheritance: Defining Operator Overloading – Overloading Unary Operators	3
	• Overloading Binary Operators – Manipulation of String using Operators	3
	• Inheritance – Defining Derived Class – Protected Derivation - Single Inheritance-Multilevel Inheritance – Multiple Inheritance	3
	• Hierarchal Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract Class – Constructors in Derived Class.	4
IV	Pointers & Virtual Functions	13
	• Pointers – new and delete operators	3
	• Pointers to Objects – this Pointer	4
	• Pointers to Derived Classes	3
	• Virtual Functions – Pure Virtual Functions.	3
V	Files	12
	• Working with Files: Classes for File Stream Operations – Opening and Closing a File	3
	• File Pointers and their Manipulations	3
	• Sequential Input and Output Operations – Error Handling during File Operations	4

	• 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.

References:

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.

LEARNING OUTCOMES

- 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.

15MCAP0210	MICROPROCESSORS AND APPLICATIONS	Credits: 4
<u>OBJECTIVES:</u> 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 		

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
II	• Assembly language program development tools.	2
	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
III	• Debugging assembly language programs	2
	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
IV	• Writing and using assembler macros	2
	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

	<ul style="list-style-type: none"> Protection mechanisms - task switching and task gates 	1
	<ul style="list-style-type: none"> Interrupt handling in PVAM - instructions for PVAM. 	2
V	Digital Interfacing	13
	<ul style="list-style-type: none"> Digital Interfacing – Objectives 	2
	<ul style="list-style-type: none"> Programmable parallel ports and handshake 	2
	<ul style="list-style-type: none"> Input/output 	2
	<ul style="list-style-type: none"> Interfacing a microprocessor to keyboards 	2
	<ul style="list-style-type: none"> Interfacing to alphanumeric ports to high power devices 	2
	<ul style="list-style-type: none"> Optical motor shaft encoders 	3
Total Contact Hours		64
Text Book: <ol style="list-style-type: none"> Microprocessors and Interfacing - Programming and Hardware, D.V. Hall, Seventh Reprint, Tata McGraw Hill Edition, New Delhi, 1995. References: <ol style="list-style-type: none"> Introduction to Microprocessors, A.P. Mathur, 3/e, Tata McGrawHill Company Limited, New Delhi 1994. Microprocessor and Micro Computer based System Design, 2/e, Mohamed Rafiquzzman, CRC Press, 1995. PC Architecture & Assembly Language, B. Kauler, Galgotia Publication, New Delhi, 1995. 		

LEARNING OUTCOMES
<p>Students should be able to</p> <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

15MATP02A1	NUMERICAL AND STATISTICAL METHODS (Proofs of theorems and derivations are not expected)	Credits: 4
OBJECTIVE: <ul style="list-style-type: none"> To impart the skills in the applications of various Numerical and Statistical Methods. 		

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: Diagramatic 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

Text Books:

- Numerical Methods in Science and Engineering, M.K. Venkataraman, 2/e, National Publishing Co., Madras, 1987, (Unit 1 & Unit 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).

References:

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.

LEARNING OUTCOMES

- 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.

15MCAP0211	LAB – III: C++ Programming	Credit: 1
I. C++ programs with <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 		

15MCAP0212	LAB – IV: Shell Programming & ALP	Credit: 1
I. Shell Programming <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 		
II. ALP using MASM <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 		

15MCAP02MX	MODULAR COURSE - I	Credits: 2
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15ENGP00C1	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. 	

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

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.

SEMESTER III

15MCAP0313	DATABASE MANAGEMENT SYSTEMS	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 		

UNIT	CONTENTS	Lecture Schedule
I	Introduction	12
	• Introduction: Database System Applications – Purpose of Database Systems	1
	• View of Data – Database Languages	1
	• Relational Databases – Database Design – Object Based and Semi structured Databases	1
	• Data Storage and Querying	1
	• Transaction Management	1
	• Data Mining and Analysis – Database Architecture	1
	• Database Users and Administrators	1
	• Relational Model: Structure of Relational Databases	1
	• Fundamental Relational Algebra Operations	1
	• Additional Relational Algebra Operations	1
	• Extended Relational Algebra Operations	1
	• Null Values – Modification of the Database	1
	SQL	12
II	• SQL: Backgrounds– Data Definition	1
	• Basic Structure of SQL Queries	1
	• Set Operations	1
	• Aggregate Functions	1
	• Null Values – Nested Subqueries	1
	• Complex Queries	1
	• Views – Modification of the Database	1
	• Joined Relations	1
	• Other Relational Languages: Tuple Relational Calculus	1
	• Domain Relational Calculus	1
	• Query–By–Example	2
	ER Model	15
III	• ER Model: Overview of the Design Process	1
	• The Entity Relationship Model–Constraints	1
	• ER Diagrams	2
	• ER Design Issues	1
	• Weak Entity Sets – Extended ER Features	1

	• Reduction to Relational Schemas	2
	• Relational Database Design: Features of Good Relational Design	1
	• Atomic Domains and First Normal Form	1
	• Decomposition using Functional Dependencies	2
	• Functional Dependencies Theory	2
	• Decomposition using Multivalued Dependencies	1
IV	Transactions	13
	• Transactions: Transaction Concepts– Transaction States	1
	• Implementation of Atomicity and Durability	2
	• Concurrent Executions – Serializability	1
	• Recoverability – Implementation of Isolation – Testing of Serializability	2
	• Recovery Systems: Failures Classification – Storage Structure	2
	• Recovery and Atomicity – Log–based Management	2
	• Failure with Concurrent Transactions	1
	• Buffer Management	1
	• Failure with Loss of Nonvolatile Storage	1
V	Object-Based Databases	12
	• Object–Based Databases: Overview – Complex Data Types	1
	• Structured Types and Inheritance in SQL	1
	• Table Inheritance	1
	• Array and Multiset Types in SQL	1
	• Object Identity and Persistent Programming Languages	1
	• 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	1
	• Heterogeneous Distributed Databases – Directory Systems	1
	Total contact Hours	64
Text Book: <ol style="list-style-type: none"> 1. Database System Concepts, 5/e, Abraham Silberchartz, Henry F. Korth and S.Sudarshan, McGraw–Hill Higher Education, International Edition, 2006. References: <ol style="list-style-type: none"> 1. Fundamentals of Database Systems, 6/e, Ramez Elamassri and Shankant B–Navathe, Pearson Education Delhi, 2010. 2. Database System Concepts, Peter Rob, Carlos Coronel, Cengage Learning, 2008. 3. Database Development and Management, Lee Chao, Auerbach Publications, 2010. 		

LEARNING OUTCOMES

- 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, Domain Relational Calculus and Query-By-Example 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

15MCAP0314	DESIGN AND ANALYSIS OF ALGORITHMS	Credits: 4
<u>OBJECTIVES:</u> <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 		

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.

References:

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.

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

15MCAP0315	VISUAL PROGRAMMING	Credits: 4
OBJECTIVE: <ul style="list-style-type: none"> This course presents a visual basic programming to enable the student to be familiar with visual programming. On successful completion of the course the student will be understood the fundamentals of GUI event programming. 		

UNIT	CONTENTS	Lecture Schedule
I	Visual Basic Overview	13
	<ul style="list-style-type: none"> Visual Basic Overview – The Visual Basic Development Environment – The Visual Basic language: Declaring Constants, Variables – Selecting Variable Types – Converting between Data types – Setting variable scope – Verifying Data types 	3
	<ul style="list-style-type: none"> Declaring Arrays and Dynamic Arrays - Declaring subroutines – Declaring functions – Preserving variables Values between calls to their procedures – 	3
	<ul style="list-style-type: none"> Handling String – Converting Strings to Numbers and Back again – Handling operators and Operator Precedence 	3
	<ul style="list-style-type: none"> Using IF..Else Statements – Using Select...case – Making Selections with Switch() and Choose() – Looping – Using Collections – Handling Dates and Times – Ending a Program at Any Time. 	4
II	Managing Forms in Visual Basic	13
	<ul style="list-style-type: none"> Managing Forms in Visual Basic – Visual Basic Menus: Adding a Menu to a Form – Modifying and Deleting Menu Items – Adding a Menu Separator – Adding access characters – Adding shortcut keys 	3
	<ul style="list-style-type: none"> Creating sub Menus – Creating immediate bang Menus – Using the Visual Basic Predefined Menus – Adding a check mark to a Menu Item – Disabling Menu Items 	3
	<ul style="list-style-type: none"> Creating and Displaying Popup Menus – Adding and Deleting Menu Items at Runtime – Adding bitmaps to Menus. 	3
	<ul style="list-style-type: none"> Handling MDI Form and MDI child Menus – Adding a list of Open Windows to an MDI form's Window Menu – Making Menus and Menu Items Visible or Invisible 	4
III	CONTROLS	13
	<ul style="list-style-type: none"> CONTROLS Text Boxes and Rich Textboxes –Command buttons, Checkboxes and Option buttons- 	3
	<ul style="list-style-type: none"> List boxes and Combo boxes- Picture Boxes and Image Controls 	3
	<ul style="list-style-type: none"> The Timer Control – The Frame Control 	3
	<ul style="list-style-type: none"> The Label Control – The Shape Control. 	4
IV	Databases	13
	<ul style="list-style-type: none"> Databases: Using DAO, RDO, And ADO: Creating and Managing Databases with the Visual Data Manager 	3
	<ul style="list-style-type: none"> Creating a Table, Filed with the Visual Data Manager – Entering a Data in Database with the Visual Data Manager 	3

	<ul style="list-style-type: none"> Adding a Data control – Opening a Database with the Data Control, Remote Data Control, ADO Data Control – Connecting a Data bases using controls- 	4
	<ul style="list-style-type: none"> Working with Database Objects in Code. 	3
V	ACTIVEX AND OLE CONCEPTS	12
	<ul style="list-style-type: none"> ACTIVEX AND OLE CONCEPTS Creating ActiveX controls And Documents – OLE : Adding an OLE control to Form – Creating, Linking and Embedding an OLE Object at Design 	3
	<ul style="list-style-type: none"> Time –Auto sizing an OLE Control – Using the OLE Control's Pop-Up Menus at Design Time – Inserting an OLE Object into an OLE Control at Runtime – Deactivating OLE Objects – 	3
	<ul style="list-style-type: none"> Activating OLE Objects with a Pop-Up Menu that lists All OLE Verbs – Activating OLE Objects from Code – 	3
	<ul style="list-style-type: none"> Handling Multiple OLE Objects – Using OLE Control Arrays to handle Multiple OLE Objects. 	3
Total Contact Hours		64
Text Book: <ol style="list-style-type: none"> Steven Holzner, 2002, Visual Basic 6 Programming Black Book, 16th Reprint Edition, Dreamtech Press Publications, New Delhi References: <ol style="list-style-type: none"> Petroutsos, E., 1998, Mastering Visual Basic 6, First Edition, Edition Reprint 2001, BPB Publications, New Delhi. Jerke, N., Nineteenth Reprint 2004, Visual Basic 6.0: The Complete reference, Tata-McGraw Hill Publishing Company Ltd., New Delhi. Gary Cornell, Second Reprint 1999, VB 6 from Ground Up, Tata Mc Graw Hill Private Ltd, NewDelhi. Brown, S., 1998, Visual Basic 6 in Record Time, BPB Publications, New Delhi. 		

LEARNING OUTCOMES

- Understand the programming constructs like data types, variables, operators, arrays, functions, control statements and looping structures.
- Understand the designing constructs like forms, menus and its varieties.
- Familiarize to create controls used to interact with the GUI applications.
- Gain knowledge of creating database and its connectivity with GUI applications.
- Understand the usage of objects created by other applications through linking and embedding processes.

15MCAP03EX	MAJOR ELECTIVE – I	Credits: 4
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15MCAP03MX	MODULAR COURSE - II	Credits: 2
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15MCAP0316	LAB – V: GUI & RDBMS	Credit: 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 		

15MCAP0317	LAB – VI: DATA STRUCTURES AND ALGORITHMS IN C++	Credit: 1
I. Data Structures <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 		
II. Algorithms <ol style="list-style-type: none"> 1. Knapsack problem 2. Prim's algorithm 3. Multistage graphs 4. All pairs shortest paths 5. 8 Queens problem 6. Sum of Subsets 7. Hamiltonian Cycle 8. Sorting – Heap, Merge, Selection, Quick 		

15MCAP0318	Mini Project on IT for Rural Development	Credits: 2
15EXNP03V1	Village Placement Programme	

15MCAP0419	JAVA PROGRAMMING	Credits: 4
<u>OBJECTIVES:</u> <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. 		

UNIT	CONTENTS	Lecture Schedule
I	Introduction and Control Statements & Arrays	13
	• Introduction – Object-Oriented Programming Concepts, Encapsulation, inheritance, polymorphism, features of Java, Types of Java programs, Java architecture	2
	• Literals - integer, floating point, character, string and boolean literals. Data types - integer, floating point , character and boolean. Variables	2
	• The structure of a Java program – comments, Expressions and Statements, Type conversion, block statements and scope	2
	• Operators –arithmetic, bitwise relational, boolean logical and Ternary. Operator precedence	3
	• Control statements – if...else, switch, while , do...while, for..., Break, continue and comma statement.	2
	• Arrays - one-dimensional and multi-dimensional arrays	2
II	Classes, Constructors & Inheritance	12
	• Classes – defining a class, the new operator and objects, the dot Operator, method declaration and calling	2
	• Constructors, instance variable hiding, this in constructor, method Overloading, passing objects as parameters to methods	2
	• Inheritance – creating subclasses, method overriding, final class, Final method, final variables	3
	• Object destruction and garbage collection, recursion, static Method, static variables and static block.	2
	• Package, the import statement, access modifier, interfaces, Defining interfaces, implementing an interface	3
III	Wrapper classes & Input and Output classes	13
	• Wrapper classes – the number class - Byte, Short, Integer, Long, Float, Double, Character and Boolean classes.	2
	• Mathematical methods - exceptions -types of exceptions	1
	• 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
	• 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.		
References: 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.		

LEARNING OUTCOMES

Upon completion of this course, students should be able to:

- 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.

15MCAP0420	COMPUTER NETWORKS	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	CONTENTS	Schedule
I	• The different types of Computer Networks and Models	13
	• Different types of communication media	3
	• Working of Data Link layer	2
	• Working of Network layer	2
	• Transport services and simple security algorithms	2
	• Reference models	2
	• Example networks	2
	• Network standardization	2
II	Communication Media	13
	• Guided transmission media	4
	• Wireless transmission	3
	• Communication satellites	3
	• The public switched telephone network	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
	• Multiple access protocols	3
IV	Network Layer	12
	• Network layer design issues	2
	• Routing algorithms	3
	• Congestion control algorithms	3
	• Quality of service	2
	• Internetworking	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.

References:

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.....

Revised Inside Networks, James K. Hardy, Prentice– Hall of India, 1999.

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15MCAP04EX	MAJOR ELECTIVE – II	Credits: 4
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15MCAP04EY	MAJOR ELECTIVE – III	Credits: 4
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15MCAP04EZ	MAJOR ELECTIVE – IV	Credits: 4
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15MCAP0421	LAB – VII: JAVA PROGRAMMING	Credit: 1
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Simple programs using

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

15MCAP0422	LAB– VIII NETWORKS	Credit: 1
<ol style="list-style-type: none">1. Host Identification and Details2. Ping and Echo Commands3. Client/ Server Implementation4. File Transfer5. Framing Techniques6. Encoding7. Multi– Client and Server8. Error Control9. Routing Algorithms10. Encryption Techniques		
15MCAP04F2	EXTENSION/FIELD VISIT	

SEMESTER V

15MCAP0523	WEB PROGRAMMING	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 complete application over the web. 		

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

Text Books:

- 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.

3. Web Technologies, TCP/IP Architecture and Java Programming, Achyut S Godole & Atul Kahate, Second Edition, Tata Mc Graw Hill, 2010

References:

1. Internet Programming, Kris jamsa and Ken cope, Galgotia Publications Pvt Ltd, 1995.
2. HTML – The Complete Reference, Powell, Tata Mc Graw Hill, 1998.
3. Mastering XML, Ann Navarre, Chuck White, BPB Publications, 2000.

LEARNING OUTCOMES

- 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
- Have Clear idea on the Domain Name System and its implementation.

15MCAP0524	MOBILE COMMUNICATIONS	Credits: 4
<u>OBJECTIVES:</u> <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. 		

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
	• Medium Access Control: SDMA, FDMA, TDMA, CDMA, Comparisons.	3
II	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
IV	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
V	Wireless Application Protocol	12
	• Wireless Application Protocol: Architecture	2
	• Protocols	4
	• WML	2
	• WML Script Applications.	4
Total Contact Hours		64

Text Books:

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

Reference:

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

LEARNING OUTCOMES

- 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

15MCAP05EX	MAJOR ELECTIVE – V	Credits: 4
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15MCAP05EY	MAJOR ELECTIVE – VI	Credits: 4
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15MCAP05EZ	MAJOR ELECTIVE – VII	Credits: 4
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15MCAP0525	Lab IX: WEB PROGRAMMING	Credit: 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 		

15MCAP0526	LAB X: .NET PROGRAMMING	Credit: 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

15MCAP0527	MINI PROJECT(MOBILE APPLICATIONS)	Credits: 2
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SEMESTER VI

15MCAP0628 Dissertation and Viva–Voce

MODULAR COURSE

15MCAP03M1	ADVANCED COMPUTING TECHNOLOGIES FOR RURAL APPLICATIONS	Credits: 2
<u>OBJECTIVES:</u> <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 		

UNIT	CONTENTS	Lecture Schedule
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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		
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		
References:		
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 , Robert E. Hoyt , Ann K. Yoshihashi, lulu.com, Feb 2014		

LEARNING OUTCOMES

- 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.

ELECTIVES

15MCAP03E1	OPTIMIZATION TECHNIQUES (Derivation of results and proofs of theorems are not expected)	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		

UNIT	CONTENTS	Lecture Schedule
I	Introduction	14
	• Mathematical Formulation of the LPP	3
	• Graphical Solutions	3
	• General LPP, Simplex Method	4

	<ul style="list-style-type: none"> • Big M Method, Phase I and Phase II Simplex Method 	4
II	Concept of Duality in L.P.P	13
	<ul style="list-style-type: none"> • Duality in L.P.P 	4
	<ul style="list-style-type: none"> • Duality and Simplex Method – Dual Simplex Method 	3
	<ul style="list-style-type: none"> • Transportation Problems IBFS by NWC and VAM 	3
	<ul style="list-style-type: none"> • Optimal Solution of TP 	3
III	Queuing System	13
	<ul style="list-style-type: none"> • Queuing System 	3
	<ul style="list-style-type: none"> • Queues Models - (M/M/1) : (∞/FIFO) 	3
	<ul style="list-style-type: none"> • (M/M/1) : (N/FIFO), 	3
	<ul style="list-style-type: none"> • (M/M/C) : (∞/FIFO), (M/M/C) : (N/FIFO) models 	4
IV	Inventory theory	12
	<ul style="list-style-type: none"> • Inventory theory 	3
	<ul style="list-style-type: none"> • EOQ Problems with no shortages – with shortages 	3
	<ul style="list-style-type: none"> • Replacement of Items that Deteriorate 	3
	<ul style="list-style-type: none"> • Replacement of Items that Fail Suddenly 	3
V	PERT and CPM	12
	<ul style="list-style-type: none"> • Network and Basic Components 	3
	<ul style="list-style-type: none"> • CPM Calculations 	3
	<ul style="list-style-type: none"> • PERT Calculations 	3
	<ul style="list-style-type: none"> • 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. References: 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.		

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.

15MCAP04E1	IMAGE PROCESSING	Credits: 4
<u>OBJECTIVES:</u> <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 		

UNIT	CONTENTS	Lecture Schedule
I	Introduction and Digital Image Fundamentals	14
	Introduction – What is Image Processing– Examples of Fields that Uses DIP – Fundamentals Step in DIP	3
	Digital Image Fundamentals – Image Sensing and Acquisition	4
	Image Sampling and Quantization	4
	Basic Relationship between Pixels	3

II	Image Enhancement Techniques	14
	Some Basic Intensity Transformation Functions	4
	Histogram Processing	4
	Fundamental Steps of Spatial Filtering – Smoothing Spatial Filters	6
III	Image Restoration	10
	Model of Image Degradation/Restoration Process	3
	Noise Models	3
	Restoration in the Presence of Noise Only Spatial Filtering.	4
IV	Image Compression	13
	Fundamentals – Coding Redundancy – Spatial and Temporal Redundancy – Irrelevant Information.	5
	Some Basic Compression Methods: Huffman Coding – Arithmetic Coding – LZW Coding – Run Length Coding – Bit-Plane Coding.	8
V	Image Segmentation and Representation	13
	Morphological Image Processing: Preliminaries – Erosion and Dilation.	6
	Fundamentals – Point, Line and Edge Detection: Line Detection – Basic Edge Detection – More Advanced Techniques for Edge Detection – Edge Linking and Boundary Detection – Thresholding	7
Total Contact Hours		64
Text Book: 1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, 3/e, Pearson Education, 2008. References: 1. Fundamentals of Digital Image Processing, Anil K. Jain, Prentice Hall of India, 1989. 2. Digital Image Processing and Analysis, B. Chandra and D. Dutta Majumder, PHI, New Delhi, 2006.		

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.

15MCAP04E4	COMPUTER GRAPHICS	Credits: 4
<u>OBJECTIVE:</u> <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. 		

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
IV	Two Dimensional Geometric Transformations	13
	• Two Dimensional Geometric Transformations: Basic Transformations – Matrix Representation	2
	• Composite Transformations – General Fixed Point – Scaling – Other Transformations	3
	• 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 References: 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.		

LEARNING OUTCOMES

- Identify the types of graphics monitors, workstations, input devices and input

<p>techniques available to work with graphics.</p> <ul style="list-style-type: none"> • 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
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15MCAP04E7	PRINCIPLES OF COMPILER DESIGN	Credits: 4
<u>OBJECTIVES:</u> <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. 		

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

	<ul style="list-style-type: none"> Finite Automata – Conversion from Regular Expressions to Finite Automata – Minimizing the Number of States of a DFA 	3
	<ul style="list-style-type: none"> Language to Specify Lexical Analyzer – Implementation of a Lexical Analyzers. 	2
II	Context-Free Grammars	19
	<ul style="list-style-type: none"> Context-Free Grammars 	2
	<ul style="list-style-type: none"> Derivations and Parse Trees 	2
	<ul style="list-style-type: none"> Capabilities of Context – Free Grammars 	1
	<ul style="list-style-type: none"> Parsers : Shift-Reduce Parsing 	3
	<ul style="list-style-type: none"> Operator Precedence Parsing 	4
	<ul style="list-style-type: none"> Top Down Parsing 	3
	<ul style="list-style-type: none"> Predictive Parsers 	4
III	Lexical Analyzer and Syntax Analyzer	14
	<ul style="list-style-type: none"> LR Parsers – Canonical Collection of LR(0) Items 	3
	<ul style="list-style-type: none"> Constructing SLR Parsing Tables 	2
	<ul style="list-style-type: none"> Canonical LR Parsing Table 	2
	<ul style="list-style-type: none"> LALR Parsing Tables 	2
	<ul style="list-style-type: none"> Syntax Directed Translation Schemes 	1
	<ul style="list-style-type: none"> Implementation of Syntax Directed Translators – Intermediate Code – Postfix Notation 	1
	<ul style="list-style-type: none"> Parse Trees and Syntax Trees 	1
	<ul style="list-style-type: none"> Three Address Code, Quadruple and Triples 	1
	<ul style="list-style-type: none"> Translation of Assignment Statements – Boolean Expressions 	1
IV	Symbol Table	8
	<ul style="list-style-type: none"> Contents of Symbol Table 	2
	<ul style="list-style-type: none"> Data Structures for Symbol Tables 	2
	<ul style="list-style-type: none"> Errors – Lexical Phase Errors 	2
	<ul style="list-style-type: none"> Syntactic Phase Errors – Semantic Errors 	2
V	Object Programs	10
	<ul style="list-style-type: none"> Object Programs – Problems in Code Generation 	2
	<ul style="list-style-type: none"> A Machine Model – A Simple Code Generator 	2
	<ul style="list-style-type: none"> Register Allocation and Assignment 	2
	<ul style="list-style-type: none"> Code Generation from DAG's 	3
	<ul style="list-style-type: none"> Peephole Optimization 	1
Total Contact Hours		64
Text Book: <ol style="list-style-type: none"> Principles of Compiler Design, Alfred V. Aho & Jeffrey D. Ullman, Narosa Publishing House, 1985. Reference Books: <ol style="list-style-type: none"> Compiler Construction Principles and Practice – D.M.Dhamadhare, McMillan India Ltd., Madras, 1983. Compiler Design Theory, Lewis.P.M., Rosenkrantz D.J., Stearn R.E., Addison-Wesley, 1976. 		

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.

15MCAP05E1	INFORMATION SECURITY	Credits: 4
<u>OBJECTIVES:</u> 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

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
	• Securing the Components	1
	• Balancing Security and Access	2
	• The SDLC, The Security SDLC	2
II	Security Investigation	12
	• Security Investigation: Need for Security	2
	• Business Needs	2
	• Threats	2
	• Attacks, Legal	3
	• Ethical and Professional Issues	3
III	Security Analysis	13
	• Security Analysis	5
	• Risk Management: Identifying and Assessing Risk	4
	• Assessing and Controlling Risk	4
IV	Logical Design	13
	• Logical Design: Blueprint for Security	2
	• Information Security Policy	2
	• Standards and Practices	2
	• ISO 17799/BS 7799, NIST Models	2
	• VISA International Security Model	2
	• Design of Security Architecture	2
	• Planning for Continuity	1
V	Physical Design	13
	• Physical Design: Security Technology	2
	• IDS	2
	• Scanning and Analysis Tools	2
	• Cryptography	2
	• Access Control Devices	2
	• Physical Security	2
	• Security and Personnel	1
Total contact Hours		64

Text Book:

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

Reference Books

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

Students should be able to explain

- The basics of Information Security
- Various Security Threats and Attacks
- Risk Management
- Various standards in Security
- The technological aspects of Information Security

15MCAP05E4	ORGANIZATIONAL BEHAVIOUR	Credits: 4
<u>OBJECTIVES:</u> <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		
UNIT	CONTENTS	Lecture Schedule

I	Importance of Organizational Behaviour	12
	• Definition, Need and Importance of Organizational Behaviour	3
	• Nature and Scope	3
	• Frame Work	3
	• Organizational Behaviour Models.	3
II	Factors Influencing Personality	12
	• Personality – Types – Factors Influencing Personality – Theories	1
	• Learning – Types of Learners – The Learning Process – Learning Theories	2
	• Organizational Behaviour Modification. Misbehavior – Types – Management Intervention. Emotions	2
	• Emotional Labour – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation	2
	• Measurement- Values. Perceptions – Importance – Factors Influencing Perception	2
	• Interpersonal Perception- Impression Management. Motivation	1
	• Importance – Types – Effects on Work Behaviour	2
III	Organization Structure	14
	• Organization Structure – Formation – Groups in Organizations	3
	• Influence – Group Dynamics – Emergence of Informal Leaders and Working Norms	3
	• Group Decision Making Techniques	3
	• Team Building – Interpersonal Relations	3
	• Communication – Control.	2
IV	Leadership Styles	12
	• Meaning – Importance	3
	• Leadership Styles – Theories	3
	• Leaders Vs Managers – Sources of Power	3
	• Power Centres – Power and Politics.	3
V	Organizational Behaviour Concepts	14
	• Organizational Culture And Climate – Factors Affecting Organizational Climate	3
	• Importance - Job Satisfaction – Determinants – Measurements – Influence on Behaviour. Organizational Change –	3
	• Importance – Stability Vs Change – Proactive Vs Reaction Change – The Change Process – Resistance To Change –	2
	• Managing Change. Stress – Work Stressors – Prevention And Management Of Stress –	2
	• Balancing Work and Life. Organizational Development –	2
	• Characteristics – Objectives –. Organizational Effectiveness	2
Total Contact Hours		64
Text Books: 1. Organisational Behaviour, Stephen P. Robins, 11/e, PHI Learning / Pearson Education, 2008. 2. Organisational Behaviour, Fred Luthans, 11/e, McGraw Hill, 2001.		
References: 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.

LEARNING OUTCOMES

- 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.

15MCAP05E7	DATA MINING	Credits: 4
<u>OBJECTIVES:</u>		
<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 		
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 	4
	<ul style="list-style-type: none"> Grid based Method : STING 	
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
Text Book: <ol style="list-style-type: none"> 1. Data Mining Concepts and Techniques, 2/e, Jiawei Han, Micheline Kamber,Morgan Kaufman Publisher(Elsevier), 2006. Reference Books: <ol style="list-style-type: none"> 1. Data Mining Techniques, Arun K Pujari, Universities Press (India) Private Limited, 2001. 2. Insight into Data Mining Theory and Practice, K.P. Soman , Shyam Diwakar, V.Ajay, Prentice Hall of India Pvt. Ltd – New Delhi, 2006. 		

LEARNING OUTCOMES

- 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
