GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

School of Computing Science and Engineering

Program: MCA

Scheme: 2017 – 2020

Curriculum

Semester 1

Sl. No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MCAP5001	Mathematical Foundation for Computer Science	3	1	0	4	20	50	100
2	MCAP5002	Introduction to Information Technology	3	0	2	4	20	50	100
3	MCAP5003	Programming in C	3	0	0	3	20	50	100
4	MCAP5004	Digital Computer Fundamentals	3	1	0	4	20	50	100
5	MCAP5005	Web Designing	3	0	0	3	20	50	100
6	MCAP5006	Web Designing Lab	0	0	2	1	50	-	50
7	MCAP5007	Programming in C Lab	0	0	2	1	50	-	50
8	SLMC5001	Communicative English	0	0	4	2	50	-	50
		Total	**15**	**2**	**10**	**22**			

Semester II

Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MCAP5009	Statistical Methods and Numerical Techniques	3	1	0	4	20	50	100
2	MCAP5010	Microprocessors	3	0	0	3	20	50	100
3	MCAP5011	Object Oriented Paradigm	3	0	0	3	20	50	100
4	MCAP5012	Data and File Structure	3	0	0	3	20	50	100
5	MCAP5017	Accounting and Financial Management	3	1	0	4	20	50	100
6	LLL524	Corporate Communication	0	0	4	2	50	-	50
7	MCAP5013	Object Oriented Paradigm Lab	0	0	2	1	50	-	50
8	MCAP5014	Data and File Structure Lab	0	0	2	1	50	-	50
9	MCAP5016	Microprocessors Lab	0	0	2	1	50	-	50
		Total	**15**	**2**	**10**	**22**			

Semester III

Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MCAP5018	Computer Architecture	3	1	0	4	20	50	100
2	MCAP5019	Programming in Java	3	0	0	3	20	50	100
3	MCAP5020	Database Management Systems	3	0	0	3	20	50	100
4	MCAP5021	Software Engineering	3	0	0	3	20	50	100
5	MCAP5022	Theory of Computation	3	1	0	4	20	50	100
6	SLMC6001	Numerical Aptitude	0	0	4	2	50	-	50
7	MCAP5026	Algorithm Analysis & Design	3	1	0	4	20	50	100
8	MCAP5023	DBMS Lab	0	0	2	1	50	-	50
9	MCAP5024	Software Engineering Lab	0	0	2	1	50	-	50
10	MCAP5025	Programming in Java Lab	0	0	2	1	50	-	50
		Total	**15**	**3**	**10**	**26**			

Semester IV

Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MCAP5034	Computer Network	3	0	0	3	20	50	100
2	MCAP5041	Advanced Operating System	3	0	0	3	20	50	100
3	MCAP5028	Computer Graphics	3	0	0	3	20	50	100
4	SLMC6022	Campus to Corporate	0	0	4	2	50	-	50
5		Elective - I	3	0	0	3	20	50	100
6	MCAP5029	Cloud Computing	3	0	0	3	20	50	100
7	MCAP5030	Computer Graphics Lab	0	0	2	1	50	-	50
8	MCAP5032	Operating System Lab	0	0	2	1	50	-	50
9	MCAP5033	Computer Network Lab	0	0	2	1	50	-	50
		Total	**15**	**0**	**10**	**20**			

Semester V

Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MCAP5045	Big Data	3	0	0	3	20	50	100
2	MCAP5046	Data Warehousing & Data Mining	3	0	0	3	20	50	100
3	MCAP5042	Complier Construction	3	0	0	3	20	50	100
4	MCAP5043	Artificial Intelligence	3	0	0	3	20	50	100
5	MCAP5044	Mobile Application Development	3	0	0	3	20	50	100
6	MCAP9998	Project-I	0	0	0	5	50		50
7		Elective - II	3	0	0	3	20	50	100
8	MCAP5048	Mobile Application Development Lab	0	0	2	1	50	-	50
		Total	**18**	**0**	**2**	**25**			

Semester VI

Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MCAP9999	Project-2	-	-	-	15	50		50
		Total				**15**			

List of Electives

Basket-1

Sl No	Course Code	Name of the Electives					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MCAP5040	Open Source Programming	3	0	0	3	20	50	100
2	MCAP5050	IOT	3	0	0	3	20	50	100

Basket-2

Sl No	Course Code	Name of the Elective					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MCAP5047	Information Retrieval	3	0	0	3	20	50	100
2	MCAP5049	Network Management & System Administration	3	0	0	3	20	50	100

Detailed Syllabus

Name of The Course	Mathematical Foundation for Computer Science			
Course Code	MCAP5001			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	1	0	4

Course Objectives:

1. Familiarize the students with the basic mathematical concepts and numerical methods.
2. To understand the concepts and results in Mathematical logic, Number theory, Group theory and Numerical methods.

Course Outcomes

CO1	Understand basic mathematical concepts and numerical methods
CO2	Gain adequate knowledge to find the roots of transcendental equations
CO3	Effectively solve non-linear algebraic equations
CO4	Design and develop various algorithms for problems in Mathematical logic, Number theory, Group theory and Numerical methods
CO5	Easily able to evaluate complex integrals numerically
CO6	Learn concepts of discrete mathematics and its influence to various functional areas like communication system, logics etc.

Text Book (s)

1. Seymour Lipschutz and Marc Lipson – Discrete Mathematics – Second Edition – Tata McGraw Hill Edition – 2002.
2. Schaums Series – Discrete Mathematics – 2nd Edition.

Reference Book (s)

1. Steven C. Chopra and Raymond P. Canale – Numerical Methods for Engineers – Fourth Edition– McGraw Hill International Edition – 2004.
2. M.K. Venkatraman – Numerical Methods – 12th Edition -National Publications & Co. – 2004.
3. Schaums Series – Numerical Analysis – 2nd Edition.

Course Content:

Unit-1: Proposition and Logic **10 hours**
Propositions and Compound Propositions – Logical Operations – Truth tables – Tautologies and Contradictions – Logical Equivalence – Algebra of propositions – Conditional and Biconditional Statements – Arguments – Logical Implications – Quantifiers – Negation of Quantified Statements – Basic Counting Principles – Factorial – Binomial Coefficients – Permutations – Combinations Pigeonhole Principle – Ordered and Unordered partitions.
Unit-2: Mathematical Induction **10 hours**
Order and inequalities – Mathematical Induction – Division Algorithm – Divisibility – Euclidean Algorithm – Fundamental theorem of Arithmetic – Congruence relation – Congruence Equations – Semigroups – Groups – Subgroups – Normal subgroups – Homomorphisms – Rings – Integral Domains – Fields – Polynomials over a Field.
Unit-3: Linear System of Equations **8hours**

Graphical Methods – Bisection Methods – False–Position Method – Fixed–point Iteration – Newton–Raphson Method – Secant Method – Multiple Roots – System of –Non-linear Equations – Roots of Polynomials: Conventional Methods – Mueller's Method – Bairstow's Method.
Unit-4: Non- Linear System of Equations 6 hours
Gauss Elimination – Non–linear system of Equations – Gauss–Jordan – LU Decomposition – Matrix Inverse – Error Analysis – Tri-diagonal Systems – Cholesky decomposition – Gauss–Seidel.
Unit-5: Differential Equations Methods 6 hours
Trapezoidal Rule – Simpson's Rule – Romberg Integration – Gauss Quadrature – Richardson Extrapolation – Derivatives and Integrals for Data with Errors.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	**Introduction to Information Technology**				
Course Code	MCAP5002				
Prerequisite					
Corequisite					
Antirequisite					
		L	**T**	**P**	**C**
		3	0	2	4

Course Objectives:

The main objective is to introduce IT in a simple language to all undergraduate students, regardless of their specialization. It will help them to pursue specialized programs leading to technical and professional careers and certifications in the IT industry.

The focus of the subject is on introducing skills relating to IT basics, computer applications, programming, interactive medias, Internet basics etc.

Course Outcomes

CO1	Understand basic concepts and terminology of information technology.
CO2	Have a basic understanding of personal computers and their operations.
CO3	Be able to identify issues related to information security
CO4	
CO5	

Text Book (s)

Reference Book (s)

Course Content:

Unit-1 Basic Computer Organization8 hours
Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.
Unit-2 Storage Fundamentals 8 hours
Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives.
Unit-3 Software 8 hours
Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w.
Unit-4Operating System 8 hours
Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi-Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.
Unit-5 Data Communication 8 hours

Communication Process, Data Transmission speed, Communication Types (modes), Data Transmission Medias, Modem and its working, characteristics, Types of Networks, LAN Topologies, Computer Protocols, Concepts relating to networking.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Programming in C				
Course Code	MCAP5003				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop applications in C using functions , pointers and structures
- To do input/output and file handling in C

Course Outcomes

CO1	Develop simple applications in C using basic constructs.
CO2	Design and implement applications using arrays and strings.
CO3	Develop and implement applications in C using functions and pointers.
CO4	Develop applications in C using structures.
CO5	Design applications using sequential and random access file processing.

Text Book (s)

1. ReemaThareja, ―Programming in C‖, Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, ―The C Programming language‖, Second Edition, Pearson Education, 2006

Reference Book (s)

1. Paul Deitel and Harvey Deitel, ―C How to Program, Seventh edition, Pearson Publication
2. Juneja, B. L and Anita Seth, ―Programming in C, CENGAGE Learning India pvt. Ltd., 2011
3. PradipDey, ManasGhosh, ―Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, ―Computer Fundamentals and Programming in C, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996

Course Content:

Unit-1Introduction	**8 hours**
Introduction to programming paradigms - Structure of C program - C programming: Data Types – Storage classes - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Pre-processor directives - Compilation process	
Unit-2Arrays and Strings	**8 hours**
Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode - Two dimensional arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search	

Unit-3FunctionsandPointers	**8 hours**
Introduction to functions: Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference	
Unit-4 Structures	**8 hours**
Structure - Nested structures – Pointer and Structures – Array of structures – Example Program using structures and pointers – Self-referential structures – Dynamic memory allocation - Singly linked list - typedef	
Unit-5 FileProcessing	**8 hours**
Files – Types of file processing: Sequential access, Random access – Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Transaction processing using random access files – Command line arguments	

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	**Digital Computer Fundamentals**			
Course Code	MCAP5004			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	1	0	4

Course Objectives:

1. Familiarize the students with the basic mathematical concepts and numerical methods.
2. To understand the concepts and results in Digital logic, Circuit, boolean algebra, sequential and combinational circuits, ALU Design and computer design

Course Outcomes

CO1	On completion of the course the student will be able to design a simple digital system.
CO2	Design and develop various algorithms for problems digital logic, Number theory.
CO3	Easily able to evaluate complex integrals numerically
CO4	Learn concepts of digital logic and its influence to various functional areas like communication system, logics etc.
CO5	

Text Book (s)

1. Thomas Floyd – Fundamentals of Digital System – Pearson Education.-3rd Edition – 2003.
2. A.P. Malvino and D.P. Leach – Digital Principles and Applications – Tata McGraw Hill 4th Edition – 1999

Reference Book (s)

1. M. Morris Mano – Digital Logic and Computer Design PHI – 5th Edition- 2004

Course Content:

Unit-1 Number ystem	**8 hours**
Number System – Converting numbers from one base to another – Complements – Binary Codes – Integrated Circuits – Boolean algebra – Properties of Boolean algebra – Boolean functions – Canonical and Standard forms – Logic operations – Logic gates – Karnough Map up to 6 variables – Don't Care Condition – Sum of Products and Products of sum simplification – Tabulation Method.	
Unit-2 Combinational Circuit	**8 hours**
Adder – Subtractor – Code Converter – Analyzing a Combinational Circuit – Multilevel NAND and NOR circuits – Properties of XOR and equivalence function – Binary Parallel Adder – Decimal Adder – Magnitude Comparator – Decoders – Multiplexers – ROM – PLA.	
Unit-3 Sequential Circuit	**8 hours**
Flip Flops – Triggering of flip–flops – Analyzing a sequential circuit – State reduction – Excitation tables – Design of sequential circuits – Counters – Design with state equation – Registers – Shift Registers – Ripple and Synchronous Counters.	
Unit-4 Memory Unit	**8 hours**
Memory Unit – Bus Organization – Scratch Pad Memory – ALU – Design of ALU – Status Register – Effects of Output carry – Design of Shifter – Processor Unit – Microprogramming – Design of specific Arithmetic Circuits.	

Unit-5 Micro-Program Control	**8 hours**
Accumulator – Design of Accumulator – Computer Configuration – Instructions and Data formats – Instruction sets – Timing and control – Execution of Instruction – Design of Computer – H/W Control – PLA control and Micro-program control.	

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Web Designing				
Course Code	MCAP5005				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

Course Outcomes

CO1	Construct a basic website using HTML and Cascading Style Sheets.
CO2	Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.
CO3	Develop server side programs using Servlets and JSP.
CO4	Construct simple web pages in PHP and to represent data in XML format.
CO5	Use AJAX and web services to develop interactive web applications

Text Book (s)

1. Deitel and Deitel and Nieto, ―Internet and World Wide Web - How to Program‖, Prentice Hall, 5th Edition, 2011.

Reference Book (s)

1. Stephen Wynkoop and John Burke ―Running a Perfect Website‖, QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.
3. Jeffrey C and Jackson, ―Web Technologies A Computer Science Perspective‖, Pearson Education, 2011.
4. Gopalan N.P. and Akilandeswari J., ―Web Technology‖, Prentice Hall of India, 2011.
5. UttamK.Roy, ―Web Technologies‖, Oxford University Press, 2011.

Course Content:

Unit-1 WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0 8 hours
Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.
Unit-2 CLIENT SIDE PROGRAMMING 8 hours
Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request – SQL.
Unit-3 SERVER SIDE PROGRAMMING 8 hours
Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server- DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - JSP: Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.

Unit-4 PHP and XML	**8 hours**
An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions- Form Validation- Regular Expressions - File handling – Cookies - Connecting to Database. XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).	
Unit-5 INTRODUCTION TO AJAX and WEB SERVICES	**8 hours**
AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.	

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Statistical Methods and Numerical Techniques			
Course Code	MCAP5009			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	1	0	4

Course Objectives:

1. Learn fundamentals of Statistical Methods
2. Learn fundamentals of Numerical techniques
3. Make student familiar with basic concepts of probability and random variables, distribution of random variables
4. Learn correlation and regression analysis and apply certain statistical concepts in practical applications of computer science areas.
5. Learn how numerical techniques are useful
6. Learn about Linear and Non Linear Equation Systems and their applicability.

Course Outcomes

CO1	Understand basics of statistical Analysis
CO2	Understand need for numerical techniques
CO3	Use statistical techniques in problem solving
CO4	Use numerical techniques in problem solving
CO5	Understand Linear and Non Linear Equations Systems

Text Book (s)

1. K.S. Trivedi – Probability and Statistics with reliability, Queuing and Computer Science Applications – Prentice Hall India – 2001.
2. A.M. Mood, F. Graybil and Boes – Introduction to Mathematical Statistics – McGraw Hill – 1974.

S.C. Gupta & V.K. Kapoor – Fundamentals of Mathematical Statistics – Sultan Chand & Sons.-2002.

Reference Book (s)

Course Content:

Unit-1:Introduction to Probability **9 hours**
Sample space – Events – Axiomatic approach to probability conditional probability Independent events – Baye's formula Random Variables – Continuous and discrete random variables – distribution function of a random variables – Characteristic of distributions – Expectation, variance, – coefficient of variation, moment generation function Chebyshev's inequality.
Unit-2 Distribution **7 hours**
Bivariate distribution – conditional and marginal distributions discrete distributions discrete uniform, Binomial poison and geometric Distributions – Continuous distributions – Uniform, Normal, Exponential and Gamma distributions.
Unit-3Statistical and Optimization techniques **9 hours**
Correlation coefficient – Rank Correlation coefficient of determination – Linear Regression – Method of Least squares – Fitting of the curve of the form ax + b, ax2+bx+c, abx and axb multiple and partial correlation (3 – variables only).

Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.
Unit-4 Linear Equations System 8 hours
Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Rate of Convergence. Finite Differences, Difference tables, Polynomial Interpolation: Newton's forward and backward formula.
Unit-5: Non- Linear Equations System 8 hours
Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula. Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules. Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, Predictor-corrector method Fitting of straight lines, polynomials, exponential curves.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Microprocessors			
Course Code	MCAP5010			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

To provide the knowledge of microprocessor programming using assembly language with hands on experience on 8086 microprocessor using emulator. It will provide hands on experience with microprocessor programming using its instruction set and to work with interfacing various peripheral devices with microprocessor and interrupt handling etc.

1. To gain an in-depth understanding of the Architecture & functionality of microprocessor's (Specifically 8086).
2. Apply the programming techniques in designing simple assembly language programs for solving simple problems by using assembly language instruction set of microprocessor .
3. Interfacing techniques for interfacing Microprocessor with peripheral devices and interrupt handling.
4. To gain an understanding of applications of microprocessors in designing processor-based automated electronics system.

Course Outcomes

CO1	Develop programs using assembly language having hands on experience on 8086 microprocessor.
CO2	Use assembly language instruction set of a microprocessor and assembler directives.
CO3	Manipulate strings, use procedures and Macros in assembly language.
CO4	Understand and handle Interrupts.
CO5	Interface Input and output devices with Microprocessor.
CO6	Emulate real hardware including the CPU, the screen, RAM and input-output devices.

Text Book (s)

1. D.V. Hall, Microprocessors & Interfacing, TMH, 3rd edition

Reference Book (s)

1. Barry B Brey, The intel microprocessor: architecture, programming and interfacing, Prentice hall of India, New Delhi, 2003.ISBN-0138027455, 4th Edition
2. Alan Clements, "Principles of Computer Hardware", Oxford University Press, 3rd Edition, 2003, ISBN-9780198564539

Course Content:

Unit-1: Introduction	**9 hours**
Computers, Microcomputer and Microprocessors-An introduction . Introduction to 8086 assembly language programming – Development steps – Construction – Writing Programs and Development Tools.	
Unit-2: Programming Techniques	**9 hours**

Standard program structures – Simple Programs – Jumps – While–do – repeat–until – Delay loops. Strings – Procedures – Macros – Instruction Descriptions – Assembler Directives.
Unit-3: Microprocessor Architecture 10 hours
8086 Microcomputer – Observing Bus signals – Minimum mode System – Troubleshooting – 8086 interrupts – Interrupt Applications – Programmable timer/Counter – Interrupt Controller.
Unit-4: Interfacing 6 hours
Parallel Ports – Handshaking – Interfacing, Digital Devices, Analog Interfacing.
Unit-5: Advance Microprocessor 6 hours
DMA – DRAMS – Cache Memories – Co–Processors – EDA Tools – 80286, 80386 and 80486, Pentiums microprocessors

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Object Oriented Paradigm			
Course Code	MCAP5011			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

To introduce students to the concept of object oriented programming. The emphasis is on the following features of object oriented programming: data hiding, operator overloading, inheritance, array based input / output and standard template library.

Course Outcomes

CO1	Overview of OOP and C++ basics
CO2	Understand about dynamic memory allocation, overloading concepts
CO3	Understand the use and write program based on Inheritance, Polymorphism, Encapsulation, virtual keyword, Operator overloading
CO4	Understand the Templates and Exception Handling in C++.
CO5	Know the file handling concepts and Input-Output Stream in C++.
	Preparing a project based on the learning acquired in this course.

Text Book (s)

1. Herbert Schildt, C++ – The Complete Reference, Third Edition – Tata McGraw Hill – 1999.

Reference Book (s)

1. Herbert Schildt, C++ – The Complete Reference, Third Edition – Tata McGraw Hill – 1999.
2. Bruce Eckel, Thinking in C++, Second Edition, Volume One, Pearson Education Asia, 2000.
3. Venugopal – Mastering C++ - Tata McGraw Hill-2001.

Course Content:

Unit-1 Introduction	**8 hours**
Introduction to OOP– Overview of C++ – Classes – Structures – Unions – Friend Functions – Friend Classes – Inline functions – Constructors – Destructors – Static Members – Scope Resolution Operator – Passing objects to functions – Function returning objects.	
Unit-2 Function Overloading	**8 hours**
Arrays – Pointers – The this pointer – References – Dynamic Allocation Operators – Function Overloading – Default function arguments – Overloading Constructors – Ambiguity in function overloading	
Unit-3 Operator Overloading	**8 hours**
Operator Overloading – Member Operator Function – Friend Operator Function – Overloading some special operators – Overloading [ ], ( ), —> and comma operator – Inheritance – Types of Inheritance – Protected members – Virtual Base Class Polymorphism – Virtual Functions – Pure virtual functions.	
Unit-4Templates and Exception Handling	**8 hours**

Class templates and generic classes – Function templates and generic functions – Overloading a function template – power of templates – Exception Handling – Derived class exception – Exception handling options – terminate() and unexpected() – uncaught_exception() function.
Unit-5Input-Output Stream **8 hours**
I/O Streams – formations I/O with ios class functions and manipulators – overloading << and >> – creating own manipulator – File I/O – Name spaces – the std name space – conversion functions – Array based I/O – An overview of the STL – The container classes – General theory of operation – Vectors.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Data and File Structure			
Course Code	MCAP5012			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	0	0	3

Course Objectives:

The objective of this course is to:

1. Be familiar with basic techniques of algorithm analysis
2. Be familiar with writing recursive methods
3. Master the implementation of linked data structures such as linked lists and Stack and binary trees
4. Understanding several sorting algorithms including quicksort, mergesort and heapsort
5. Understanding graph algorithms such as shortest path and minimum spanning tree and file organization
6. Master analyzing problems and writing program solutions to problems using the above techniques

Course Outcomes

CO1	Identify and define the most appropriate data structure(s) for a given problem	
CO2	Expert in application of linear and non linear data structure(s) to solve various problems.	
CO3	Expert in developing programs using STACK and QUEUE principles and Linked List to solve various problems.	
CO4	Expert in calculating and comparing complexities of various searching and sorting algorithms.	
CO5	Understand comparison of Recursion and Loops.	

Text Book (s)

1. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication

Reference Book (s)

1. Data Structures using C & C++ -By Ten Baum Publisher – Prenctice-Hall International.
2. Fundamentals of Computer Algorithms by Horowitz, Sahni,Galgotia Pub. 2001 ed.
3. Fundamentals of Data Structures in C++-By SartajSahani.
4. Data Structures: A Pseudo-code approach with C -By Gilberg&Forouzan Publisher-Thomson Learning.

Course Content:

Unit-1Introduction to Data Structure	**8 hours**
Data Management concepts, Data types – primitive and nonprimitive, Performance Analysis and Measurement (Time and space analysis of algorithms-Average, best and worst case analysis), Types of Data Structures- Linear & Non Linear Data Structures.	

Unit-2 Linear Data Structure **8 hours**
Representation of arrays, Applications of arrays, sparse matrix and its representation., Stack: Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi, Queue: Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue, Linked List: Singly Linked List, Doubly Linked list, Circular linked list ,Linked implementation of Stack, Linked implementation of Queue, Applications of linked list.
Unit-3 Non- Linear Data Structure **8 hours**
Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (Inorder, postorder, preorder), Threaded binary tree, Binary search trees, Conversion of General Trees To Binary Trees, Applications Of Trees- Some balanced tree mechanism, eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance , Graph-Matrix Representation Of Graphs, Elementary Graph operations,(Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree)
Unit-4 Hashing and File Structures **8 hours**
Hashing: The symbol table, Hashing Functions, Collision-Resolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods.
Unit-5External Sorting and Searching Techniques **8 hours**
External Sorting- Run lists, Tape sorting; Sorting on Disks, Generating Extended Initial Runs. External Searching, Introduction to Static Hashing, Dynamic Hashing Techniques.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Accounting and Financial Management			
Course Code	MCAP5017			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	1	0	4

Course Objectives:

The main objective of this subject is to provide basic working knowledge of accounting and financial management and to know how accounting and financial management helps the management to take decision. It provides analysis and interpretation of financial statements of organizations and understand the budget and budgetary control in organizations. It helps to find out marginal cost incurred and acquire knowledge in project proposal method using capital budgeting.

Course Outcomes

CO1	Predict the financial statement of public limited company
CO2	Capable of preparing the various budgets
CO3	Forecasting the future needs of the business

Text Book (s)

1. Maheswari"costAccounting"Vikas publishing house

Reference Book (s)

1. S. N. Maheswari-"Elements of Management Accountancy"-Sultan Chand & Co., 3rd Edition, 1996.
2. P.C. Tulisan – "Financial Accounting" – Tata McGraw Hill Publication, New Delhi – First Edition, 2002.
3. I .M Pandey-"Financial management"-Vikas publishing house

Course Content:

Unit-1 Introduction To Accounting **8 hours**
Principles of Double entry – Journalizing, Ledger – Posting and preparation of Trial Balance – Preparation of Trading Account, Profit and loss Account and Balance Sheet including Adjustments (Simple problems only).
Unit-2 Ratio Analysis **8 hours**
Ratio analysis – uses of ratios in interpreting the Final Accounts (Trading a/c–Profit and Loss A/c and Balance Sheet) – Final Accounts to as well as Ratios to Final Accounts Problems. (Simple problems only).
Unit-3 Profit Analysis **8 hours**
Meaning of variable cost and fixed cost – Cost–Volume – Profit Analysis – Calculation of Break–even point.
Unit-4 Budgets **8 hours**
Preparation of and Characteristics of functional Budgets – Production, Sales, Purchases, Cash and Flexible budgets.
Unit-5 Cash Flow **8 hours**
Method of Capital investment decision making: Pay back Method, ARR Method – Discounted Cash Flow – Methods including Net Present Value and IRR Method.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Computer Architecture			
Course Code	MCAP5018			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	1	0	4

Course Objectives:

1. Explain the organization of the classical von Neumann machine and its major functional Modules.
2. Explain how an instruction is executed in a classical von Neumann machine.
3. Provide knowledge of computer system organization and structure through instruction cycles.
4. Provide knowledge of system interconnection and the different I/O techniques.
5. Explain the basic concepts of interrupts and how interrupts are used to implement I/Ocontrol and data transfers.
6. Identify various types of buses in a computer system and illustrate how data transfers is performed.

Course Outcomes

CO1	**Understand the organization of basic computer.**
CO2	Compare different types of instructions.
CO3	Apply the principles and the implementation of computer arithmetic.
CO4	Understand the operation of modern CPUs and use of Pipelining.
CO5	Apply memory hierarchy to achieve efficient memory system.
CO6	Analyze different I/O Techniques.

Text Book (s)

1. M. M. Mano – Computer System Architecture – 3rd Edition – PHI – 1994

Reference Book (s)

1. Patterson, Computer Organisation and Design, Elsevier Pub. 2009
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", 6th edition, Pearson Education, 2003.
3. David A.Patterson and John L.Hennessy, "Computer Organization and Design: The hardware / software interface", 2nd Edition, Morgan Kaufmann, 2002.
4. John P.Hayes, "Computer Architecture and Organization", 3rd Edition, McGraw Hill, 1998.

Course Content:

Unit-1 Central Processing Unit **8 hours**
Central Processing Unit ,General Register and Stack Organization – Instruction Formats – Addressing Modes– Data Transfer and manipulation – Program Control – RISC.
Unit-2 Pipelining and Vector Processing **8 hours**
Pipelining – Arithmetic Instruction and RISC Pipelining– Vector Processing – Array Processors.
Unit-3 ComputerArithmetic 8 hours

Computer Arithmetic – Addition and Subtraction – Multiplication and Division Algorithms – Floating-Point and decimal Arithmetic operations.
Unit-4Input–Output Organization 8 hours
Input–Output Organization – Peripheral devices – I/O Interface – Asynchronous Data Transfer – Modes of Transfer – Priority Interrupt – Direct Memory – Access I/O Processor – Serial Communications.
Unit-5 Memory Organization 8 hours
Memory Organization – Memory Hierarchy – Main Memory Auxiliary Memory– Associative Cache and Virtual Memory – Interconnection Structures – Interprocessor Arbitration.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Programming in Java			
Course Code	MCAP5019			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. The aim of the course is to introduce students Core Java Concepts and to teach students the basic concepts of Java programming.
2. This course covers preliminaries, I/O streaming and file handling and teach students how to programme applets in Java, networking and allow the students to implement effectively remote method invocation (industrial java) to understand applets.
3. There are programs that can be embedded in a Web page and accessed over the Internet with database access (may be remote database).

Course Outcomes

CO1	Understand basic concepts of Java Programming
CO2	At the end of the course the student will be able to write efficiently the java programs
CO3	To design and develop various Exception Handling Process
CO4	Can develop applets, able to access database with JDBC
CO5	Work with networking protocols using java with attractive GUI

Text Book (s)

1. R. Naughton and H. Schildt – Java2 (The Complete Reference) – Fifth Edition – TMH – 2004.

Reference Book (s)

1. K. Arnold and J. Gosling – The Java Programming Language – 3rd Edition., Pearson Edu, 2005
2. David Flanagan – Java in a Nutshell: A Desktop Quick Reference for Java Programmers – O'Reilly & Associates, Inc. 1999
3. Bruce Eckel –Thinking in Java – Prentice Hall, 2nd Ed 2002.

Course Content:

Unit-1 Introduction **8 hours**
Object oriented fundamentals, Features of Java, Java Virtual Machine (JMV), Byte-Code ,JAVA buzzwords, JAVA Environments, Command Line Arguments, Java program structure, Reserved keywords, Identifiers, Literals, Operators, Separators, Variables, Declaring a variable, Scope and lifetime of variables, Data types, Control Statements.
Unit-2 Class and Methods **8 hours**
Arrays: One-Dimensional Arrays, Two-dimension Array, Strings, String Handling, Vectors, Wrapper Classes. Class:Fundamentals,The General Form of a Class,A Simple Declaring Objects ,Assigning Object Reference Variables. Methods: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing,Returning Objects, Recursion Introducing Access Control, Overriding Methods, Final Variables and Methods, Final class, Finalize Methods, Abstract Methods and Class, Visibility Control.

Unit-3 Packages and Interface	**8 hours**
Inheritance : Basic ,Types of Inheritance, Member Access, Creating a Multilevel Hierarchy, When Constructors Are Called Method Overriding ,Dynamic Method Dispatch ,Why Overridden Methods?, Applying Method Overriding, Using Abstract Classes, Using final with Inheritance, Using final to Prevent Overriding . Using final to Prevent Inheritance, Object Class, Packages and Interfaces.	
Unit-4 Multithreading and Exception Handling	**8 hours**
Exception Handling: Exception as Objects, Exception hierarchy, Try, Catch, Finally, Throw.Multithreading: Creating threads, Thread Life Cycle, Main Thread, Multiple Threads ,Isalive() and join() ,Simple thread program ,Threads Priorities, Thread synchronization.	
Unit-5 Applet and Graphic Programming	**8 hours**
Applet Programming: Local and remote applets, Building Applets Code, Applet Life Cycle, Creating an Executable Applet, Designing a web page, Applet Tag, , Passing parameters to Applets, AWT, Graphic Programming: Graphic Class, Drawing lines, Arcs, Rectangles, Polygon, Ellipse, Circle. I/O file in JAVA,: Stream Classes, Byte Stream Classes, Character Stream Classes and Stream Benefits.	

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Database Management Systems			
Course Code	MCAP5020			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The aim of this course is to introduce the students to basic concepts of databases and database management systems with emphasize on relational databases. The entity relationship diagram helps the students to design the database and the concept of normalization. The SQL and PL/SQL are taught so as teach how to create tables, manipulate table and how to create stored procedure. The objective of the course is make the students well versed with relational database and introduce them to the concepts of object-oriented database, multimedia database and distributed databases.

Course Outcomes

CO1	To learn the fundamentals of data models and to represent a database system using ER diagrams
CO2	To study SQL and relational database design.
CO3	To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
CO4	To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.
CO5	To have an introductory knowledge about the Storage and Query processing Techniques

Text Book (s)

1. Henry F. Korth and Abraham Silberschatz, Database System Concepts, McGraw Hill International Publications, 2002.

Reference Book (s)

1. Gerald V. Post – Database management systems – Designing and Building Business Applications – McGraw Hill International edition – 2nd Ed , 2002.
2. Thomas Connolly, Carolyn Begg - Database System – Pearson Education
3. Raghu Ramakrishnan – Database Management Systems – WCB/McGraw Hill , 3rd Ed, 2003.
4. Ivan Bayross - Pl Sql book
5. C.J.Date: Introduction to Database Systems, Pearson Education.
6. ElmasriNavrate: Data base Management System, Pearson Education.

Course Content:

Unit-1 Introduction to Database Management System **8 hours**
An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models, schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.
Unit-2 Entity Relationship Model **8 hours**

Overview of hierarchical, Network & Relational Database Management Systems, ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationship of higher degree.
Unit-3 Relational Model and SQL Query 8 hours
Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, Relational algebra, Relational calculus, Tuple and Domain calculus. Introduction on SQL, Characteristics of SQL, advantage of SQL. SQl data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQ.
Unit-4 Normalization 8 hours
Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, Alternative approaches to database design.
Unit-5 Overview of Transaction Management and Concurrency Control 8 hours
Overview of Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of transaction, Lock Based Concurrency Control, Performance Locking, Transaction Support in SQL, Introduction to Crash recovery. Concurrency Control: Serializability, and recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques, Concurrency without Locking.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Software Engineering				
Course Code	MCAP5021				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

1. Develop complex systems (including analysis, design, construction, maintenance, quality assurance and project management) using the appropriate theory, principles, tools and processes.
2. Use appropriate computer science and mathematics principles in the development of software systems.
3. Solve problems in a team environment through effective use of written and oral communication skills.
4. Have knowledge of current issues presently involved in effectively performing duties as a software practitioner in an ethical and professional manner for the benefit of society.
5. Practice the lifelong learning needed in order to keep current as new issues emerge.
6. Develop software in at least one application domain.

Course Outcomes

CO1	The ability to apply software engineering theory, principles, tools and processes, as well as the theory and principles of computer science and mathematics, to the development and maintenance of complex software systems.
CO2	The ability to design and experiment with software prototypes.
CO3	The ability to select and use software metrics.
CO4	The ability to participate productively on software project teams involving students from both software engineering and other majors.
CO5	Effective communications skills through oral and written reports and software documentation evaluated by both peers and faculty

Text Book (s)

1. Roger S. Pressman, ―Software Engineering – A Practitioner‟s Approach‖, Seventh Edition, McGraw-Hill International Edition, 2010.
2. Ian Sommerville, ―Software Engineering‖, 9th Edition, Pearson Education Asia, 2011.

Reference Book (s)

1. Rajib Mall, ―Fundamentals of Software Engineering‖, Third Edition, PHI Learning PrivateLimited, 2009.
2. PankajJalote, ―Software Engineering, A Precise Approach‖, Wiley India, 2010.
3. Kelkar S.A., ―Software Engineering‖, Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R.Schach, ―Software Engineering‖, Tata McGraw-Hill Publishing Company Limited,2007.
5. http://nptel.ac.in/

Course Content:

Unit-1 Software Process and Agile Development	8 hours

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process.
Unit-2 Requirements Analysis and Specification **8 hours**
Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.
Unit-3 Software Design **8 hours**
Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.
Unit-4 Testing and Maintenance **8 hours**
Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging –Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.
Unit-5 Project Management **8 hours**
Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection - Risk Management-Risk Identification-RMMM Plan-CASE TOOLS

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Theory of Computation			
Course Code	MCAP5022			
Prerequisite				
Corequisite				
Antirequisite				
	L	**T**	**P**	**C**
	3	1	0	4

Course Objectives:

- To understand the language hierarchy
- To construct automata for any given pattern and find its equivalent regular expressions
- To design a context free grammar for any given language
- To understand Turing machines and their capability
- To understand undecidable problems and NP class problems

Course Outcomes

CO1	Construct automata, regular expression for any pattern.
CO2	Write Context free grammar for any construct.
CO3	Design Turing machines for any language.
CO4	Propose computation solutions using Turing machines.
CO5	Derive whether a problem is decidable or not.

Text Book (s)

1**.** J.E.Hopcroft, R.Motwani and J.D Ullman, ―Introduction to Automata Theory, Languages and Computations‖, Second Edition, Pearson Education, 2003.

Reference Book (s)

1. H.R.Lewis and C.H.Papadimitriou, ―Elements of the theory of Computation‖, Second Edition, PHI, 2003.
2. J.Martin, ―Introduction to Languages and the Theory of Computation‖, Third Edition, TMH, 2003.
3. MichealSipser, ―Introduction of the Theory and Computation‖, Thomson Brokecole, 1997.

Course Content:

Unit-1 AUTOMATA FUNDAMENTALS **8 hours**
Introduction to formal proof – Additional forms of Proof – Inductive Proofs –Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – Finite Automata with Epsilon Transitions
Unit-2 REGULAR EXPRESSIONS AND LANGUAGES 8 hours
Regular Expressions – FA and Regular Expressions – Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata**.**
Unit-3 CONTEXT FREE GRAMMAR AND LANGUAGES 8 hours
CFG – Parse Trees – Ambiguity in Grammars and Languages – Definition of the Pushdown Automata – Languages of a Pushdown Automata – Equivalence of Pushdown Automata and CFG, Deterministic Pushdown Automata.
Unit-4 PROPERTIES OF CONTEXT FREE LANGUAGES 8 Hours

Normal Forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.
Unit-5 UNDECIDABILITY **8 Hours**
Non Recursive Enumerable (RE) Language – Undecidable Problem with RE – Undecidable Problems about TM – Post's Correspondence Problem, The Class P and NP.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Algorithm Analysis & Design			
Course Code	MCAP5026			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	1	0	4

Course Objectives:

To introduce students, the concepts of algorithm analysis for find out the space and time complexity of different algorithms. Different design techniques such as greedy method, divide and conquer, backtracking, dynamic programming, branch and bound are to be studied for finding the solution to the different problems. It also provides an insight into the basic concepts of NP and NP-hard problems and their relevance in research.

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Course Outcomes

CO1	Analyze algorithms and determine efficiency of algorithm.
CO2	Ability to analyze asymptotic runtime complexity of algorithms including formulating recurrence relations.
CO3	Understand advanced abstract data type (ADT), data structures and their implementations.
CO4	Design algorithms using the Dynamic, greedy, divide and conquer, branch and bound etc. methodologies.
CO5	Prove problems of P, NP, or NP-Complete.
CO6	Apply important algorithmic design paradigms, implement learned algorithm using appropriate techniques to solve real world problems

Text Book (s)

1. AnanyLevitin, ―Introduction to the Design and Analysis of Algorithms‖, Third Edition, Pearson Education, 2012.
2. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007.

Reference Book (s)

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, ―Introduction to Algorithms‖, Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, ―Data Structures and Algorithms‖, Pearson Education, Reprint 2006.
3. Harsh Bhasin, ―Algorithms Design and Analysis‖, Oxford university press, 2016.
4. S. Sridhar, ―Design and Analysis of Algorithms‖, Oxford university press, 2014.
5. http://nptel.ac.in/

Course Content:

Unit-1 Introduction	**8 hours**
Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties. Analysis Framework – Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms - Visualization	
Unit-2 BRUTE FORCE AND DIVIDE-AND-CONQUER	**8 hours**
Brute Force – Computing an – String Matching - Closest-Pair and Convex-Hull Problems - Exhaustive Search - Travelling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort – Heap Sort - Multiplication of Large Integers – Closest-Pair and Convex - Hull Problems.	
Unit-3 DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE	**8 hours**
Dynamic programming **–** Principle of optimality **-** Coin changing problem**,** Computing a Binomial Coefficient – Floyd‘s algorithm – Multi stage graph - Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique – Container loading problem - Prim‘s algorithm and Kruskal's Algorithm – 0/1 Knapsack problem, Optimal Merge pattern - Huffman Trees.	
Unit-4 ITERATIVE IMPROVEMENT	**8 hours**
The Simplex Method - The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs, Stable marriage Problem.	
Unit-5 COPING WITH THE LIMITATIONS OF ALGORITHM POWER	**8 hours**
Lower - Bound Arguments - P, NP NP- Complete and NP Hard Problems. Backtracking – n-Queen problem - Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound – LIFO Search and FIFO search - Assignment problem – Knapsack Problem – Travelling Salesman Problem - Approximation Algorithms for NP-Hard Problems – Travelling Salesman problem – Knapsack problem.	

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Computer Network			
Course Code	MCAP5034			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

To produce a core knowledge of networking concepts and techniques to design simple network, provide in-depth knowledge about the various communication technology and enable the student to understand how information are transmitted in networks. To introduce the students the concepts of wireless communications and various applications in computer networks.

Course Outcomes

CO1	Develop knowledge about physical structure of computer network
CO2	Analysis the problem in different layer during the communication in network
CO3	Identify the security issue in network during the data transfer
CO4	Expert to use of Internet and public network
CO5	Understand the connection management in network at transport layer
CO6	Develop the knowledge about congestion control over the network during the data transmission

Text Book (s)

1. L. L. Peterson and B. S. Davie, Computer Networks: A Systems Approach, 4th Ed, Elsevier India,
2. A. S. Tanenbaum, Computer Networks, 4th Ed, Pearson India

Reference Book (s)

1. Forouzen, "Data Communication and Networking", TMH
2. A.S. Tanenbaum, Computer Networks, Pearson Education
3. W. Stallings, Data and Computer Communication, Macmillan Press
4. S. Keshav, An Engineering Approach to Computer Networking, 1st Ed, Pearson India, 1999.
4. J. F. Kurose and K. W. Ross, Computer Networking: A Top Down Approach, 3rd Ed, Pearson India, 2005

Course Content:

Unit-1 Introduction	**8 hours**
Terminology used in Computer Networks, Evolution of computer networks, Goals and Applications of Networks, Basic communications model, – types of Connections, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay	

Analysis, Back Bone Design, Local Access Network Design, – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences, Switching methods, ISDN, Terminal Handling.
Unit-2 Data link layer
Framing, HDLC, PPP, sliding window protocols, medium access control, Token Ring, Wireless LAN; Virtual circuit switching: Frame relay**MAC Sub Layer:** Channel Allocations, LAN protocols: ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Error Handling: Parity – LRC – CRC – Hamming code. Flow Control: stop and wait – go back-N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11 – FDDI - SONET – Bridges.
Unit-3 Network Layer
Network Layer - Point-to-Pont Networks, routing, Congestion control, Internetworking: – Packet Switching and Datagram approach, IP addressing methods: Subletting, Routing, Distance Vector Routing, Link State Routing,Structure of a router. TCP / IP, IP packet, IPv4, IPv6.
Unit-4 Transport Layer
Design issues, **Duties of transport layer:** Multiplexing, De-multiplexing, connection management, Sockets, User Datagram Protocol (UDP),Transmission Control Protocol (TCP), Congestion Control, Quality of services (QOS), TCP Window Management. Integrated Services.TCP RTT estimation, Overlay Networks. **Session Layer:** Design issues, remote procedure call. **Presentation Layer:** Design issues, Data compression techniques
Unit-5 Application Layer
File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks: Internet and Public Networks. Domain Name Space (DNS), SMTP, FTP, HTTP, WWW, Peer-to-peer file sharing networks **Security:**Symmetric & Public Cryptography, RSA, Digital Signature, Hash Functions, IP Security, Web Security, System Security

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Advanced Operating System				
Course Code	MCAP5041				
Prerequisite	"Data Structures and Algorithms", "C-Programming"				
Corequisite	"Linux"				
Antirequisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. Learn fundamental operating system abstractions such as processes, threads, files, Semaphores, IPC abstractions, shared memory regions, etc.,
2. Learn how the operating system abstractions can be used in the development of application programs, or to build higher level abstractions,
3. Learn how the operating system abstractions can be implemented,
4. Learn the principles of concurrency and synchronization, and apply them to write correct concurrent programs/software,
5. Learn basic resource management techniques (scheduling, time management, space management) and principles and how they can be implemented. These also include issues of performance and fairness objectives, avoiding deadlocks, as well as security and protection.

Course Outcomes

CO1	Understand functions and services of Operating system and identify the use of system calls
CO2	Understand different type of CPU Scheduling Algorithm
CO3	Understand process concept and synchronization of concurrent processes.
CO4	Understand classical problems of concurrent processes and their solution.
CO5	Understand concept of deadlock in system and its methods of handling deadlocks.

Text Book (s)

1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
2. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition.

Reference Book (s)

1. Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
2. Harvey M Dietel, " An Introduction to Operating System", Pearson Education
3. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition.

Course Content:

Unit-1 Introduction **8 hours**
Introduction – Types of Operating Systems – I/O structure – Dual–mode operation – Hardware protection – General system architecture. Implementation of processes, Threads- Thread model, thread usage, Implementation of threads in user space and kernel, Hybrid implementations.
Unit-2 **8 hours**

Process Management: Process concept – Concurrent process scheduling concepts – CPU scheduling – Scheduling algorithms, Multiple processors Scheduling – Critical section – Synchronization hardware – Semaphores, classical problem of synchronization, lnterprocess communication. Deadlocks: Characterization, Prevention, Avoidance and Detection.
Unit-3 **8 hours**
Storage management – Swapping, single and multiple partition allocation – paging – segmentation – page segmentation, virtual memory – demand paging – page replacement and algorithms, thrashing. Secondary storage management – disk structure – free space management – allocation methods – disk scheduling – performance and reliability improvements – storage hierarchy
Unit-4 **8 hours**
Files and protection – file system organisation – file operations – access methods – consistency semantics – directory structure organisation – file protection – implementation issues – security encryption.
Unit-5 **8 hours**
Distributed operating system concept – Architectures of Distributed Systems, Distributed Mutual Exclusion, Distributed Deadlock detection, Agreement protocols, Threads, processor Allocation, Allocation algorithms , Distributed File system design; Real Time Operating Systems: Introduction to Real Time Operating Systems, Concepts of scheduling , Real time Memory Management.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Computer Graphics			
Course Code	MCAP5028			
Prerequisite	Basic Computer Application, Analytical Skills, C programming language.			
Corequisite	"C-Programming"			
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To impart technological aspects of graphics problem solving through computer.
2. To lay foundation for the two and three dimensional computer graphics problem solving.
3. Introducing students the interdisciplinary nature of computer graphics with wide variety of applications and examples.
4. To lay foundation for animation, cartoon movie, presentation software, video games and GUI software development specially in coding.

Course Outcomes

CO1	Learn and understand the concept of graphics, graphics system and its components.
CO2	Learning concept of graphical device handling.
CO3	Understanding the fundamentals of graphics problem solving and able to implement graphics package and also write algorithms for graphics drawing.
CO4	Develop GUI applications, Video games and other software with high level abstractions.
CO5	Develop graphics routines for text handling and apply them to write programs/software.

Text Book (s)

1. Donald Hearn and M Pauline Baker, "Computer Graphics C Version", Pearson Education

Reference Book (s)

1. Heam Donald, Pauline Baker M: "Computer Graphics", PHI 2nd Edn. 1995.
2. Harrington S: "Computer Graphics - A Programming Approach", 2nd Edn. McGrawHill.
3. ShaliniGovil-Pai, Principles of Computer Graphics, Springer, 2004**.**

Course Content:

Unit-1 Introduction	**8 hours**
Overview of Graphics Systems: Video display devices, Raster-Scan System, Random-Scan Systems. Random-Scan Systems Graphics monitors and work stations. Input devices: Hard copy devices. Graphics software. Output primitives: Line drawing algorithms circle generation algorithms. Ellipse Generating Algorithm. Pixel Addressing. Filled-Area Primitives. Fill Area Function, Cell Array, Character Generation.	
Unit-2 Transformation	**8 hours**

Attributes of Output Primitives:Line Attributes, Curve Attributes, Color and Gray-Scale levels.Area-Fill Attributes, Character Attributes. Bundled attributes. Inquiry functions.Two-dimensional geometric transformations: Basic transformations. Homogenous coordinates, composite transformations, other transformations. Affine transformations, transformation functions, Roster methods for transformations.
Unit-3 Viewing and Clipping **8 hours**
Two-dimensional viewing: The viewing pipeline, viewing transformation, viewing functions. Line clipping, Cohen Sutherland line clipping, Liang Barsky line clipping Polygon clipping: Sutherland-Hodgman polygon clipping, WeilerAmerton polygon clipping.
Unit-4 3-D Representation **8 hours**
Three Dimensional Concepts: Three Dimensional Display Methods. Three Dimensional Object Representations: Polygon surfaces, curved line and surfaces, spline representations, Bezier Curves & Surfaces, BSP line Curves and Surfaces, Constructive Solid- Geometry Methods, Octrees, BSP trees. Fractal geometry methods.
Unit-53-D Transformation **8 hours**
Three Dimensional Geometric and, Modeling Transformations Three Dimensional viewing: Projections Visible Surface Detection Methods: back face detection method, depth buffer method Basic illumination methods: Phong&Gourand Shading, Texture Mapping. Computer Animation: Design of Animation Sequences, General Computer Animation, Raster Animations, Computer-Animation Languages, Key-Frame Systems, Motion Specifications

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Cloud Computing				
Course Code	MCAP5029				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

1. To study the importance of virtualization.
2. To study the cloud delivery models
3. To study the cloud deployment models.
4. To Study Cloud security and applications

Course Outcomes

CO1	Understand cloud computing delivery models.
CO2	Understand briefly cloud computing deployment models
CO3	Understanding of security and workload in cloud.
CO4	Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization
CO5	Ability to handle cloud application issues.

Text Book (s)

1. Cloud Computing: Principles and Paradigms, Editors: RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
2. Cloud Computing First Steps: Cloud Computing for Beginners, Ravi Shankar, Navin Sabharwal, PBC Distributors

Reference Book (s)

1. Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
2. Virtualization For Dummies, 3rd HP Special Edition (Bernard Golden)
3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010 T10: D.Ulman, “Principles of Database and Knowledge base System”, Computer Science Press.

Course Content:

Unit-1 Introduction to Virtualization **8 hours**
Traditional IT Infrastructure, Benefits of Virtualization, Compare. Study of Hypervisors, VM
Unit-2 Introduction to Cloud Computing **8 hours**
History Cloud Computing, Cloud Benefits, Limitations, challenges; Importance of Virtualization in Cloud, Anatomy of Cloud, Cloud deployment models; Cloud delivery models; Stepping stones for the development of cloud, Grid Computing
Unit-3 Cloud Models **10 hours**

Decision Factors for Cloud Implementations, Public, Private and Hybrid Cloud, Infrastructure as a Service (IaaS) Cloud Delivery Model, Platform as a Service (PaaS) , Software as a Service (SaaS)
Unit-4 Cloud Workloads and Security 6 hours
Cloud workload Overview, Workloads most suitable for Cloud, Workloads not suitable for Cloud. Intro to cloud security, Trust, and Privacy.
Unit-5 Design & Development of Cloud Applications 6 hours
Economics of choosing a Cloud platform for an organization based on application requirements, economic constraints and business needs , Applications deployment on Amazon, Microsoft , IBM, Google, Salesforce.com.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Big Data				
Course Code	MCAP5045				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

1. Understand concepts of big data
2. Understand the architecture of Hadoop.
3. Learn types of analytics and techniques.
4. Make students understand different clustering techniques
5. Learn Hadoop and NoSQL

Course Outcomes

CO1	The students shall be able to understand basis of Big Data concepts
CO2	The students shall be able to understand Hadoop concepts
CO3	The students shall be able to do the programming using Map Reduce
CO4	The students shall be able to understand the use of Hive and Pig
CO5	The students shall be able to do the programming and analytic using R, Hive and Pig

Text Book (s)

1. Programming in Hive, Edward Capriolo, Dean Wampler& Jason Roanexylen – O Reilly Media., New Delhi, 2012.
2. Hadoop : The definition Guide , Tom White - O Reilly Media., New Delhi, 2010.
3. Programming in Pig ,Adan Gates- O Reilly Media., New Delhi, 2011.
4. Programming in R, Paul Teetor- O Reilly Media., New Delhi, 2011.

Reference Book (s)

1. Programming in Hive, Edward Capriolo, Dean Wampler& Jason Roanexylen – O Reilly Media., New Delhi, 2012.
2. Hadoop : The definition Guide , Tom White - O Reilly Media., New Delhi, 2010.
3. Programming in Pig ,Adan Gates- O Reilly Media., New Delhi, 2011.
4. Programming in R, Paul Teetor- O Reilly Media., New Delhi, 2011.

Course Content:

Unit-1 Introduction to Big Data **8 hours**
Introduction ,Big Data Definition and its importance, 5 V's(type of Big Data),tools for Big Data, Big Data Analytics, Big Data Applications, Big Data Terminologies, Big Data Challenges, Big Data Characteristics.
Unit-2 Introduction to Hadoop **8 hours**

Big Data- Apache Hadoop, Hadoop Distributed File System, Objective, Goal of HDFS Apache Hadoop Installation modes-Standalone, Pseudo Distributed Mode, Fully Distributed Mode, Cloudera-Installation & Configuration, Design of HDFS, HDFS Concepts, Importance of commands of HDFS, types of HDFS commands.
Unit-3 Hadoop E ecosystem and Overview of Map Reduce 8 hours
Introduction to Pig, Introduction to Hive, Introduction to HBase, Introduction to Map Reduce, Objective, Map Reduce Introduction, Concepts of Map Reduce, History of Map Reduce, Automatic Parallel Execution in Map Reduce, Map Reduce Framework, How to Map & Reduce together, Map Reduce Examples, Work Flow of Map Reduce, Map Reduce Future.
Unit-4 Putting Hive and Pig To Work 8 hours
Introduction to Pig- Modes, Data Types, File format supported in Pig, Ways to code in Pig, Operators in Pig, Functions in Pig, Introduction to Hive-creation of table using map Reduce, Bucketization, Joins, Comments, Data Types, Partition operators, Metadirectory, Role of Hive in Hadoop, Command line Interface, Commands- Alter Table, Group By, Group By Operator ,Difference between Hive & Pig.
Unit-5 Big Data Analytics using R 8 hours
Introduction to R- Features, Installing R, Basic Syntax, Working with R, saving & running a Program, Concept of Data types-Variables, Assignments, Operators, Conditional Statements, Function- Defining Functions, Calling a Function, Files-working with Database files, creating, manipulating, Data Visualization, Data Analytics Examples

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Data Warehousing & Data Mining			
Course Code	MCAP5046			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

Understand the concept of data warehousing. Understand the multidimensional data storage for system. Learn the OLAP techniques for data analysis. Make students understand the knowledge discoveries in databases. Learn data mining techniques. Introduction to Decision support system.

Course Outcomes

CO1	Students should know about design issues of data warehousing.
CO2	Students should learn various mining tools.
CO3	Students able to identify the real time problems and able to design solution using various mining tools.
CO4	Make students understand the knowledge discoveries in database.
CO5	Learn data mining techniques

Text Book (s)

1. Data Mining- Concepts & Techniques; Jiawei Han &MichelineKamber- 2001, Morgan Kaufmann.

Reference Book (s)

1. Data Mining Techniques; ArunPujar; 2001, University Press; Hyderbad.
2. Data Mining; Pieter Adriaans&DolfZantinge; 1997, Pearson,
3. Data Warehousing, Data Miniing and OLTP; Alex Berson, 1997, McGraw Hill.
4. Building the Data Warehouse; W.H. Inman, 1996, John Wiley & Sons.
5. Developing the Data Warehouses; W.H Ionhman,C.Klelly, John Wiley & Son

Course Content:

Unit-1 Introduction to Data Warehousing and Data Mining **8 hours**
Data warehousing Definition, usage and trends. DBMS vs data warehouse, Data marts, Metadata, Multidimensional data mode, Data cubes, Schemas for Multidimensional Database: stars, snowflakes and fact constellations.
Unit-2 Data Warehousing concepts and ETL process **8 hours**
Data warehouse implementation, computation of data cubes, modelling OLAP data, OLAP queries manager, data warehouse back end tools, complex aggregation at multiple granularities, tuning and testing of data warehouse, ETL process.
Unit-3 Business Analysis **8 hours**

Business Analysis. Reporting & Query Tools & Applications. On line Analytical processing (OLAP). Patterns & Models. Statistics. Artificial Intelligence. Data mining definition & task, KDD versus data mining, data mining techniques, tools and applications.
Unit-4 Data Mining Techniques **8 hours**
Data mining query languages, data specification, specifying knowledge, hierarchy specification, pattern presentation & visualization specification, data mining languages and standardization of data mining. Data mining techniques: Association rules, Clustering techniques, Decision tree.
Unit-5 Advanced databases **8 hours**
Mining complex data objects, Spatial databases, Multimedia databases, Time series and Sequence data; mining Text Databases and mining Word Wide Web.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	**Complier Construction**				
Course Code	MCAP5042				
Prerequisite	Theory of Computation				
Corequisite					
Antirequisite					
	L	**T**	**P**	**C**	
	3	0	0	3	

Course Objectives:

The course will have project where students will have to develop compiler for a subset of C language using tools like Lex and Yacc. The target environment will be SPIM simulator.

1. Know working of compiler.
2. Study lexical and syntax analysis in compiler.
3. Study type checking and use of storage.
4. Understand use of activation tree and activation records
5. Study and analyze code generation and code optimization.

Course Outcomes

CO1	Understand different tools used in compiler.
CO2	Know about lexical analysis works and the working and generation of parsing in compiler.
CO3	Understand use of type checking and L and S attributes of expression.
CO4	Gain the knowledge about use of storage, activation tree and records in compiler.
CO5	Learn how compilers optimize code and use it

Text Book (s)

1. Aho, Sethi, Ullman, Compilers: Principles, Techniques, and Tools, Addison-Wesley.

Reference Book (s)

1. Steven S. Muchnick, Advanced compiler design and implementation.

Course Content:

Unit-1 Introduction	**8 hours**
Analysis-synthesis model of compilation, various phases of a compiler, tool based approach to compiler construction	
Unit-2 Lexical and Syntax Analysis	**8 hours**
Lexical analysis: interface with input, parser and symbol table, token, lexeme and patterns, difficulties in lexical analysis, error reporting, and implementation. Regular definition, Transition diagrams, LEX. Syntax analysis: context free grammars, ambiguity, associativity, precedence, top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing, Bottom up parsing, operator precedence grammars, LR parsers (SLR, LALR, LR), YACC.	
Unit-3Syntax directed definitions and Type checking	**8 hours**

Inherited and synthesized attributes, dependency graph, evaluation order, bottom up and top down evaluation of attributes, L- and S-attributed definitions.type system, type expressions, structural and name equivalence of types, type conversion, overloaded functions and operators, polymorphic functions.
Unit-4 Run time system **8 hours**
Storage organization, activation tree, activation record, parameter passing, symbol table, dynamic storage allocation.
Unit-5 Intermediate code generation **8 hours**
Intermediate representations, translation of declarations, assignments, Intermediate Code generation for control flow, Boolean expressions and procedure calls, implementation issues.Code generation and instruction selection: issues, basic blocks and flow graphs, register allocation, code generation

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Artificial Intelligence			
Course Code	MCAP5043			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To provide a strong foundation of fundamental concepts in Artificial Intelligence
2. To provide a basic exposition to the goals and methods of Artificial Intelligence
3. To enable the student to apply these techniques in applications which involve perception, reasoning and learning.
4. Distinguish between a conventional system and an intelligent system.
5. Artificial Intelligent techniques in solving problems of a particular domain

Course Outcomes

CO1	Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms)
CO2	Understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving
CO3	Know how to build simple knowledge-based systems.
CO4	Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information.
CO5	Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems.

Text Book (s)

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", 2nd Edition, Pearson Education / Prentice Hall of India, 2004.

Reference Book (s)

1. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw- Hill, 2003

Course Content:

Unit-1 Introduction **8 hours**
Intelligent agents – agents and environments - good behavior – the nature of Environments – structure of agents - Problem Solving - problem solving agents – example problems – searching for solutions – uniformed search strategies – avoiding repeated states – searching with partial information
Unit-2 SEARCHING TECHNIQUES **8 hours**
Informed search and exploration – Informed search strategies – heuristic function – local search algorithms and optimistic problems – local search in continuous spaces – online search agents and unknown environments - Constraint satisfaction problems (CSP) – Backtracking search and Local search for CSP – Structure of problems - Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision – games that include an element of chance.

Unit-3 KNOWLEDGE REPRESENTATION	**8 hours**
First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution - Knowledge representation – Ontological Engineering - Categories and objects – Actions - Simulation and events - Mental events and mental objects	
Unit-4 LEARNING	**8 hours**
Learning from observations - forms of learning - Inductive learning - Learning decision trees - Ensemble learning - Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming - Statistical learning methods - Learning with complete data – Learning with hidden variable - EM algorithm - Instance based learning - Neural networks - Reinforcement learning – Passive reinforcement learning - Active reinforcement learning - Generalization in reinforcement learning	
Unit-5 EXPERT SYSTEMS	**8 hours**
Defining Expert Systems – Expert system architecture – Building Expert Systems. Methodologies for building expert systems: knowledge acquisition and elicitation; formalization; representation and evaluation. Knowledge Engineering tools- Robotics - Robot Architectures	

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	**Mobile Application Development**				
Course Code	**MCAP5044**				
Prerequisite	XML, Java				
Corequisite					
Antirequisite					
		L	**T**	**P**	**C**
		3	0	0	3

Course Objectives:

1. Basics of Android OS
2. Develop Basic and advance Android Apps
3. Publishing and Monetizing the app

Course Outcomes

CO1	Understand about Android OS and its Development Environment
CO2	Concept of concepts of android application development, user interface design, shared preferences.
CO3	DevelopBasic and advance android app development for android devices.
CO4	Publish the app
CO5	Monetize from app development.

Text Book (s)

1. W.M Lee, "Begning Android 4 Application Development",Wiley
2. Retro Meier,"Android 4 Application Development",Wiley

Reference Book (s)

1. B. Phillips et al., Android Programming: Big Nerd Ranch Guide (as mentioned above);
2. Christian Keur and Aaron Hillegass, iOS Programming: The Big Nerd Ranch Guide, 6th edition, 2016;
3. Valentino Lee, Heather Schneider, and Robbie Schell, Mobile Applications: Architecture, Design and Development, Prentice Hall, 2004;
4. Tomasz Nurkiewicz and Ben Christensen, Reactive Programming with RxJava, O'Reilly Media, 2016;
5. Raoul-Gabriel Urma, Mario Fusco, and Alan Mycroft, Java 8 in Action: Lambdas, Streams, and Functional-Style Programming, Manning Publications, 2015;

Course Content:

Unit-1 Introduction **5 hours**
History of Android, Features of Android, Android Devices, Android Versions, Open Handset Alliance (OHA) , Advantages of Android, Comparing Android with other platform, Architecture of Android. Android Directory Structure, Structure of Manifest files, Android Development Tools.
Unit-2 User Interfaces **10 hours**
Views, Views Group, Widgets - Button, EditText, CheckBox, TextView, ToggleButton, Layouts, Styles, Themes, Orientation, Screen Size and Density, Unit of measurement - px, dp, sp and dpi,pt, conversion of dp to px
Unit-3 Component s of Android **10 hours**

Activities, Activity life cycle,Intents, types of intents, Intent Filter, Fragment, fragment lifecycle, Services, Broadcast receivers, Content providers, Starting a new activity, Sending and Receiving of data
Unit-4 Advance App Development **10 hours**
SQLite database, Cursors and content values, Opening and closing Database, Sensors, Bluetooth, GeoLocation, SMS & MMS, Graphics and Animation
Unit-5 Security, Publishing, Monetizing **5 hours**
Security Creating a signing certificate, Signing your applications for distribution, Publishing on Google Play, Monetization strategies, Application promotion strategies, Using Google Analytics

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Open Source Programming				
Course Code	MCAP5040				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Objectives:

1. Understand the difference between open source software and commercial software.
2. Familiarity with Linux operating system.
3. Understanding and development of web applications using open source web technologies like Apache, MySql and PHP (LAMP/XAMP).

Course Outcomes

CO1	Understand the difference between open source software and commercial software.
CO2	Identify, install and run Linux operating system, Install and manage applications
CO3	Identify, install open source web technologies Apache, MySql, PHP.
CO4	Develop web applications using LAMP.
CO5	Write session control PHP code for a website.

Text Book (s)

1. James Lee and Brent Ware ,"Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", , Dorling Kindersley(India) Pvt. Ltd, 2008.

Reference Book (s)

1. Eric Rosebrock, Eric Filson ,"Setting Up LAMP: Getting Linux, Apache, MySQL, and PHP and working Together", Published by John Wiley and Sons, 2004.

Course Content:

Unit-1 Introduction **8 hours**
OPEN SOURCE: Introduction to Open Source – Open Source vs. Commercial Software – What is Linux? - Free Software – Where I can use Linux? Linux Kernel – Linux Distributions
Unit-2 **8 hours**
LINUX: Introduction to Linux Essential Commands - Filesystem Concept - Standard Files 1. The Linux Security Model - Vi Editor - Partitions creation - Shell Introduction 2. String Processing - Investigating and Managing Processes - Network Clients - Installing Application
Unit-3 **8 hours**
APACHE: Apache Explained - Starting, Stopping, and Restarting Apache - Modifying the Default Configuration - Securing Apache - Set User and Group - Consider Allowing Access to Local Documentation - Don't Allow public html Web sites - Apache control with .access
Unit-4 **8 hours**
MYSQL: Introduction to MYSQL - The Show Databases and Table - The USE command - Create Database and Tables - Describe Table - Select, Insert, Update, and Delete statement - Some Administrative detail - Table Joins - Loading and Dumping a Database.
Unit-5 **8 hours**
PHP: Introduction- General Syntactic Characteristics - PHP Scripting - Commenting your code - Primitives, Operations and Expressions - PHP Variables - Operations and Expressions Control Statement - Array - Functions - Basic Form Processing - File and Folder Access - Cookies -

Sessions - Database Access with PHP - MySQL - MySQL Functions - Inserting Records - Selecting Records - Deleting Records - Update Records.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	IOT			
Course Code	MCAP5050			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. Understand the architecture of Internet of Things and connectedworld.
2. Explore on use of various hardware, communication and sensing technologies to buildIoT applications.
3. Illustrate the real time IoT applications to make smartworld.
4. Understand challenges and future trends inIoT.

Course Outcomes

CO1	Understand and intuition of the whole process line of extracting knowledge from data aboutthe Internet ofThings
CO2	Deep insight in one of the specializations within the network, depending on the study and the choice of the concepts ofIoT.
CO3	Design and implementation/modification of methods involved inIoT.
CO4	Describe what IoT is and the skill sets needed to be a networkanalysis.
CO5	Apply basic IoT algorithms for predictive networkperformance.

Text Book (s)

1. ArshdeepBahga, Vijay Madisetti, “Internet of Things: A Hands-on-Approach”, VPT, 1stEdition, 2014.

2. Matt Richardson, Shawn Wallace, “Getting Started with Raspberry Pi”, O’Reilly (SPD), 3rd Edition, 2014.

Reference Book (s)

1. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, John Wiley andSons2014.
2. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach toConnecting Everything”, Apress Publications,1st Edition2013.

Course Content:

Unit-1 INTRODUCTION TO INTERNET OF THINGS (IoT) 6 hours
Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT enabling technologies,IoT levelsanddeployment, domain specific IoTs.
Unit-2 IoT AND M2M 9 hours
Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.
Unit-3 IoT PLATFORMS DESIGN METHODOLOGY 9 hours
IoT Architecture: State of the art introduction, state of the art; Architecture reference model: Introduction, reference model and architecture, IoT reference model. Logical design using Python: Installing Python, Python data types and data structures, control flow, functions, modules, packages, file handling.

Unit-4 IoT PHYSICAL DEVICES AND ENDPOINTS	**8 hours**
Introduction to Raspberry Pi interfaces (Serial, SPI, I2C), programming Raspberry PI with Python, other IoT devices	
Unit-5 IoT PHYSICAL SERVERS AND CLOUD OFFERINGS	**8 hours**
Introduction to cloud storage models and communication APIs, WAMP – AutoBahn for IoT, Xively cloud for IoT, case studies illustrating IoT design – home automation, smart cities, smart environment.	

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100

Name of The Course	Information Retrieval			
Course Code	MCAP5047			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. Learn the information retrieval models.
2. Be familiar with Web Search Engine.
3. Be exposed to Link Analysis.
4. Understand Hadoop and Map Reduce.
5. Learn document text mining techniques.

Course Outcomes

CO1	Apply information retrieval models.
CO2	Design Web Search Engine.
CO3	Use Link Analysis.
CO4	Use Hadoop and Map Reduce.
CO5	Apply document text mining techniques.

Text Book (s)

1. C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval , Cambridge University Press, 2008.
2. Ricardo Baeza -Yates and BerthierRibeiro - Neto, Modern Information Retrieval: The Concepts and Technology behind Search 2 nd Edition, ACM Press Books 2011.
3. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1 st Edition Addison Wesley, 2009.
4. Mark Levene, An Introduction to Search Engines and Web Navigation, 2 nd Edition Wiley, 2010.

Reference Book (s)

1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
2. OphirFrieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series ", 2 nd Edition, Springer, 2004.
3. Manu Konchady, "Building Search Applications: Lucene, Ling Pipe", and First Edition, Gate Mustru Publishing, 2008.

Course Content:

Unit-1 INTRODUCTION	**8 hours**
Introduction -History of IR- Components of IR - Issues –Open source Search engine Frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web.	
Unit-2 INFORMATION RETRIEVAL	**8 hours**

Boolean and vector-space retrieval models- Term weighting - TF-IDF weighting- cosine similarity – Preprocessing - Inverted indices - efficient processing with sparse vectors – Language Model based IR - Probabilistic IR –Latent Semantic Indexing - Relevance feedback and query expansion.
Unit-3 WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING 8 hours
Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement - search engine optimization/spam – Web Search Architectures - crawling - meta-crawlers- Focused Crawling - web indexes –- Near-duplicate detection - Index Compression - XML retrieval.
Unit-4 WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH 8 hours
Link Analysis –hubs and authorities – Page Rank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity - Hadoop& Map Reduce - Evaluation - Personalized search - Collaborative filtering and content-based recommendation of documents and products – handling "invisible" Web - Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.
Unit-5 DOCUMENT TEXT MINING 8 hours
Information filtering; organization and relevance feedback – Text Mining -Text classification and clustering - Categorization algorithms: naive Bayes; decision trees; and nearest neighbor - Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Network Management & System Administration			
Course Code	MCAP5049			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

Students will learn and apply basic concepts and methodologies of System Administration and Security by building from the ground up a miniature corporate network. They will be responsible for installing backend servers that users would normally require for day to day operations. They will also be responsible for validating, from a user's perspective that their network is functional. Lastly, they will implement security measures into the network and do a risk assessment as to how effective their security measures are and their fellow students. Students will use Microsoft Windows Server 2008 for the Active Directories servers, and Microsoft Windows XP and/or 7 for the clients. Also, Ubuntu 10.10 and/or CentOS 5.6 will be used for the networking part of the class. All server and client computers are Virtual Machines working on a VMware environment

Course Outcomes

CO2	Set-up and use Virtual Private Network
CO3	Explain Network protocols and services
CO4	Install and configure Network server operating system
CO5	Configure various services on Windows server platform

Text Book (s)

1. "Networking Fundamentals, Microsoft Official Academic Course (MicrosoftCorporation)", Wiley, 2011.
2. "MTA Security Fundamentals, Microsoft Official Academic Course(MicrosoftCorporation)", Wiley, 2011.

Reference Book (s)

1. "Windows Server Administration Fundamentals, Microsoft Official AcademicCourse (Microsoft Corporation)", Wiley, 2011.
2. Adam Header, Stephen Addison Schneiter, James Stanger and Bruno Gomes Pessanha,LPI "Linux certification in Nut shell", Third edition, O'Reilly, 2010.

Course Content:

Unit-1 Introduction **8 hours**
Basic Hardware: Network Fundamentals: Local Area Networking - Defining Networks with the OSI Model - Wired and Wireless Networks - Internet Protocol - Implementing TCP/IP in the Command Line- Working with Networking Services - Understanding Wide Area Networks - Defining Network Infrastructures and Network Security.
Unit-2 Security Fundamentals **8 hours**
Security Fundamentals: Security Layers – Authentication – Authorization - Accounting - Security Policies - Network Security - Server and Client Protection.
Unit-3 Windows Server Fundamentals **8 hours**

Windows Server Fundamentals: Server Overview - Managing Windows Server 2008 R2 - Managing Storage - Monitoring and Troubleshooting Servers - Essential Services - File and Print Services - Popular Windows Network Services and Applications.
Unit-4 Linux Fundamentals **8 hours**
Linux Fundamentals: System Architecture-Determine and Configure Hardware Settings- Boot the System - Change Run Levels and Shut Down or Reboot System -Linux Installation and Package Management
Unit-5 File Systems **8 hours**
File Systems- Create Partitions and File systems - Maintain the Integrity of File Systems - Control Mounting and Unmounting of File Systems. Manage Disk Quotas - File Permissions and Ownership - Create and Change Hard and Symbolic Links.

Continuous Assessment Pattern

Internal Assessment (IA)	**Mid Term Test (MTE)**	**End Term Test (ETE)**	**Total Marks**
20	30	50	100