



GALGOTIAS UNIVERSITY

Syllabus of

Course Book MCA 2016-19

Name of School: School of Computing Science & Engineering

Department: Computer Application & Information Science

Year: 2016-19

Curriculum

Semester 1								
Sl. No	Course Code	Name of the Course					Assessment Pattern	
			L	T	P	C	MTE	ETE
S No.	Course Code	Course Name	L	T	P	C	50	50
1	MCA111	Mathematical Foundation for Computer Science	3	1	0	4	50	50
2	MCA113	Programming in C	3	0	0	3	50	50
3	MCA 114	Digital Computer Fundamentals	3	1	0	4	50	50
4	MCA 115	Web Designing	3	0	0	3	50	50
5	MCA112	Introduction to Information Technology	3	1	0	4	50	50
6	MCA151	Programming in C Lab	0	0	2	1	50	50
7	MCA152	Web Designing Lab	0	0	2	1	50	50
8	LLL512	Communicative English	0	0	4	2	50	50
								22
Semester II								
Sl No	Course Code	Name of the Course					Assessment Pattern	
			L	T	P	C	MTE	ETE
1	MCA121	Statistical Methods and Numerical Techniques	3	1	0	4	50	50
2	MCA122	Microprocessors	3	0	0	3	50	50
3	MCA123	Accounting & Financial Management	3	1	0	4	50	50
4	MCA124	Object Oriented Paradigm	3	0	0	3	50	50
5	MCA125	Data and File Structure	3	0	0	3	50	50
6	LLL524	Corporate Communication	0	0	4	2	50	50
7	MCA141	Object Oriented Paradigm lab	0	0	2	1	50	50
8	MCA142	Data and File Structure Lab	0	0	2	1	50	50
9	MCA143	Microprocessors Lab	0	0	2	1	50	50
		Total Credits						22
Semester III								
Sl No	Course Code	Name of the Course					Assessment Pattern	
			L	T	P	C	MTE	ETE
1	MCA211	Algorithm Analysis & Design	3	1	0	4	50	50
2	MCA212	Computer Architecture	3	1	0	4	50	50
3	MCA213	Programming in Java	3	0	0	3	50	50
4	MCA214	DBMS	3	0	0	3	50	50
5	MCA222	Software Engineering	3	0	0	3	50	50
6	MCA217	Theory of Computation	3	1	0	4	50	50
7	MCA252	DBMS Lab	0	0	2	1	50	50
8	MCA243	Software Engineering Lab	0	0	2	1	50	50
9	MCA251	Programming in Java Lab	0	0	2	1	50	50
10	LLL514	Numerical Aptitude	0	0	4	2	50	50
		Total Credits						26

Semester IV									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MCA221	Computer Network	3	0	0	3		50	50
2		Program Elective-I	3	0	0	3		50	50
3	MCA223	Operating System	3	0	0	3		50	50
4	MCA224	Computer Graphics	3	0	0	3		50	50
5	MCA227	Cloud Computing	3	0	0	3		50	50
6	LLL622	Personality Development	0	0	4	2		50	50
7		Program Elective Lab	0	0	2	1		50	50
8	MCA247	Computer Graphics Lab	0	0	2	1		50	50
9	MCA242	Computer Network Lab	0	0	2	1		50	50
10	MCA241	Operating System Lab							
		Total Credits							21
Semester V									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C		MTE	ETE
1	MCA311	Data Warehousing & Data Mining	3	0	0	3		50	50
2	MCA312	Compiler Construction	3	1	0	4		50	50
3	MCA313	Artificial Intelligence	3	0	0	3		50	50
4	MCA315	Mobile Application Development	3	0	0	3		50	50
5	MCA352	Mobile Application Development Lab	0	0	2	1		50	50
6	MCA350	Project-1	0	0	0	5		50	50
7	MCA318	Internet of Things	3	0	0	3		50	50
8	P5045	Elective BIG DATA	3	0	0	3		50	50
		Total Credits							25
Semester VI									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MCA500	Project-2	Project-2	-	-	-	50		50
		Total Credits							15

List of Electives

Basket-1

Sl No	Course Code	Name of the Electives					Assessment Pattern		
			L	T	P	C		MTE	ETE
1	MCA226	Advance DBMS	3	0	0	3		50	50
2	MCA248	Advance DBMS LAB	0	0	2	1		50	50
3	MCA229	Open Source Programming with Python	3	0	0	3		50	50
4	MCA246	Open Source Programming with Python Lab	0	0	2	1		50	50

Detailed Syllabus

Semester I

Course Code: MCA111	Mathematical Foundation for Computer Science	L	T	P	C
Version No. 01	Date of Approval:	3	0	0	3
Prerequisite/Exposure	Basic knowledge of Mathematical function				
Co-requisites					

COURSE OBJECTIVES

- To introduce the concepts of mathematical logic
- To introduce the concepts of sets, relations, and functions.
- To perform the operations associated with sets, functions, and relations.
- To introduce generating functions and recurrence relations.

COURSE OUTCOME

CO1: Ability to apply mathematical logic to solve problems Knowledge.

CO2: Understand permutation, combination, and recurrence relations.

CO3: Able to use algebraic structure to define and reason about fundamental mathematical concepts.

CO4: Able to formulate problems and solve recurrence relations.

CO5: Understand about the lattices and Boolean algebra.

CO6: Understanding the latest advances and its applications in MFCS.

COURSE CONTENT:

UNIT – I LOGIC

9 hours

Statements – Connectives – Truth Tables – Normal forms – Predicate calculus – Inference – Theory for Statement Calculus and Predicate Calculus – automata theorem proving.

UNIT – II COMBINATORICS

9 hours

Review of Permutation and Combination - Mathematical Induction - Pigeon hole principle - Principle of Inclusion and Exclusion - generating function - Recurrence relations.

UNIT – III ALGEBRAIC STRUCTURES

9 hours

Semi group - Monoid - Groups(Definition and Examples only) Cyclic group - Permutation group (S_n and D_n) - Substructures - Homomorphism of semi group, monoid and groups - Cosets and Lagrange Theorem – Normal Subgroups - Rings and Fields (Definition and examples only)

UNIT – IV RECURSIVE FUNCTIONS

9 hours

Recursive functions - Primitive recursive functions - computable and non - computable functions.

UNIT – V LATTICES

9 hours

Introduction, partially ordered set, Hasse diagram, Well ordered set, Lattices, Bounded Lattices, Complemented and Distributed Lattices, Boolean Algebra.

UNIT- VI RESEARCH

The advances and the latest trends in the course as well as the latest applications of the areas covered in the course. The latest research conducted in the areas covered in the course.

Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums.

Discussion on some of the latest products available in the market based on the areas covered in the course and patents filed in the areas covered.

TEXT BOOK

Gersting J.L., Mathematical Structure for Computer Science, 3rd Edition W.H. Freeman and Co., 1993.

REFERENCES

1. Lidl and pitz., Applied Abstract Algebra, Springer - Verlag, New York, 1984.
2. K.H. Rosen, Discrete Mathematics and its Applications, Mc-Graw Hill Book Company, 1999.
3. <http://www.mhhe.com/rosen>.

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	PROGRAMMING IN C			
Course Code	MCA113			
Prerequisite	Computer Fundamentals			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of this course is to:

1. To introduce students to the concepts of C programming.
2. Provide more emphasis on several topic of C programming like -functions, arrays, pointers, structures, files handling.
3. Learn to develop program using „C“ language.

Course Outcomes

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

CO1	1. The student would acquire the concept of C language.
CO2	2. The student will able to develop application program using C language.
CO3	3. Implement and develop projects using C
CO4	Understanding the concept of structures and union.
CO5	Analyze various approaches for different types of File operations

Text Book (s)

1. E. Balagurusamy – Programming in ANSIC – Tata McGraw Hill 3rd Edition– 2004.

Reference Book (s)

1. B.S. Gottfried – Programming with C – Schaum's Outline Series – Tata McGraw Hill 2nd Edition – 1998.
2. K.R. Venugopal, Sudeep R. Prasad – Programming with C – Tata McGraw Hill - 2002.
3. YashavantKanetkar – Let us C – BPB Publications- 5th Edition - 2004.

Unit-1 BASICS OF C PROGRAMMING	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-2Function	8 hours
Function Prototyping – Function Arguments – Actual vs. Formal Parameters – Pointers – Pointer Variables – Pointers Concepts in Functions – Multiple Indirection., Arrays of Pointers, function pointer, array of function pointer in C, function pointer as argument in C	
Unit-3Arrays	8 hours
Arrays – Accessing Array Elements Pointers and Arrays – Arrays as Function Arguments – Function Returning Addresses – Dynamic Memory Allocation –new () and free()-Dangling pointer in C, Storage Classes.	
Unit-4Structure and Unions	7 hours
Structures – Unions – typedef – enum – Array of Structures – Pointers to Structures – Macros and Pre-processor, Nested Structure ,size of () in structure, padding in structure	
Unit-5 File Handling	4hours
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 argument	

Continuous Assessment Pattern

Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
50	50	100

Name of The Course	Digital Computer Fundamentals			
Course Code	MCA114			
Prerequisite	Computer Fundamentals			
Corequisite				
Antirequisite				
	L	T	P	C
	3	1	0	4

Course Objectives:

The objective of this course is to:

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.

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

Unit-1 Number System	8 hours
Number systems - Binary, octal, decimal and Hexa-decimal, Conversion from different number systems to others, 1's complement and 2's complement, 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 : Introduction, Flip-flop types : RS, Clocked RS, JK, JK Master slave, D; Applications of flip-flops, Shift Registers, Types of shift register – SISO, SIPO, PISO, PIPO and Applications shift Register, Counters – Classification – Asynchronous counter, 4-bit asynchronous ripple counter, Synchronous counter, 4-bit Up/Down counter, Applications.	
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

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Web Designing			
Course Code	MCA115			
Prerequisite	Programming Language			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of this course is to:

1. Enable the students to understand web-based site planning, management and maintenance.
2. Explain the concept of developing advanced HTML,ASP,JavaScript, XML pages.
3. This course enables students to develop web sites which are secure and dynamic in nature.
4. Design and implement an internet database application using existing tools and techniques.

Course Outcomes

At the end of this course students will be able:

CO1	Demonstrate the ability to create web pages using Students will demonstrate the ability to create images for web pages using.
CO2	Understand range of real world web design approaches and critically evaluate these approaches.
CO3	Develop web pages that present information, graphics and hypertext links to other web pages in a cohesive manner, and build up with peers a website using CSS structure, while demonstrating awareness of usability and other web design issues
CO4	Examine and assess the effectiveness of a web design system in a real time environment.

Text Book (s)

1. .Ramesh Bangia, “Internet and Web Design” , New Age International
2. Xavier, C, “ Web Technology and Design” , New Age International

Reference Book (s)

1. Deitel, “Java for programmers”, Pearson Education
2. Ivan Bayross,” HTML, DHTML, Java Script, Perl & CGI”, BPB Publication.
3. Jackson, “Web Technologies” Pearson Education
4. Patel and Barik, ”Introduction to Web Technology & Internet”, Acme Learning

MCA105: Web Designing		L	T	P	C
Version No.	2.0	3	0	2	4
Prerequisite					
Objectives:	To make students understand intricacies of the various aspects of web portal development and to enhance the skills of writing content for web pages and to make efficient site maps to navigate web pages. It enables to understand the procedure for hosting the web pages on the internet/intranet and to exploit the client server architecture and it allows to dynamically update web pages using Active server pages and Dynamic HTML.				
Expected Outcome:	After completing this course students will be able to design web sites.				
Module I	Introduction				
Introduction to Web Designing – Web Server, Web Client – Browser & Web Server Communication – HTTP Protocol – HTML Document Basic Structure – Creating Links between Documents – Creating Tables – Creating Forms – The Input Element – Select Element – Text Area Element.					
Module II	DHTML and VB Script				
DHTML Object Model – Underlying Principles of the DHTML – Basic Components of DHTML – Introduction of Scripting – Scripts in HTML – VBScript – Variables – Functions – Intrinsic Functions – Conditional & Loops – VBScript Objects – Building a Sample Form.					
Module III	Java Script				
JavaScript – Introduction to JavaScript – Variables – Conditional and Loops – Events – Functions – Frames – HTML document – Predefined Objects – Image Object – Layers – Drag and Drop – Building a Sample Form.					
Module IV	Cascading Style Sheets				
CSS – Introduction to Cascading Style Sheets – Inline Styles – Style Sheets – Grouping & Short Hand Properties – Inheritances – Classes – Link – Cascading Styles – Dynamic Style – Multimedia on the Web – Playing Multimedia – Streaming Multimedia – Animated GIFs – Creating Video Audio for the Web.					
Module V	Active Server Page				
Web Services – ASP Fundamentals – ASP Objects – Application Object – Session Object – Request Object – Response Object – Session Object – Design a Simple Web Page Using ASP – Design a simple web page with database connectivity.					
Reference Books					
<ol style="list-style-type: none"> Eric M. Schurman William J. Pardi.-Dynamic HTML in Action, 2nd Edition, Web Technology-1999. Microsoft Visual Interdev 6.0, Microsoft Press-1998. William Martiner -VB Programmer’s Guide to Web Development,- 1999. Ivan Bayross -Web Enabled Commercial Application Development Using HTML, DHTML, Java Script, Perl, CGI-2000. Scot Hillies and Daniel Mezick -Programming Active Server Pages, Microsoft Press.-1997. 					
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination				
Recommended by the Board of Studies on:					
Date of Approval by the Academic Council:					

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	INTRODUCTION TO INFORMATION TECHNOLOGY			
Course Code	MCA112			
Prerequisite	Computer Fundamentals			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of this course is to:

1. Familiarize the students with the basic concepts of Information Technology.
2. To understand the concepts of Memories, Computer networks, Display devices, programming languages, Database, world wide web, Security and Integrity of Information & Intellectual Property Rights

Course Outcomes

CO1	Explain and summarize the history and development of information technologies, including computing hardware, software, and Internet-based technologies.
CO2	Compare and analyze the fundamental structures of computer networks and the Internet.
CO3	Explain about various input output devices & operating System
CO4	Learn about database, its structure & spreadsheets
CO5	Learn about Internet applications, Security, privacy and IPR

Text Book (s)

Introduction of Information Technology, by V. Rajaraman, PHI Learning Private Limited.

Unit-1	8 hours
Data and Information: Introduction, Types of Data, A Simple Model of a Computer, Data Processing Using a Computer, Desktop Computer Data Storage: Introduction, Memory Cell, Physical Devices used as Memory Cells, Random access Memory, Read only Memory, Secondary Memory, Floppy Disk Drive, Compact Disk Read only Memory (CDROM), Archival Memory	
Unit-2	8 hours
Central Processing Unit: Introduction, The Structure of a Central Processing Unit, Specification of a CPU, Interconnection of CPU with Memory and I/O Units, Embedded Processors Computer Networks: Introduction, Local Area Network (LAN), Applications of LAN, Wide Area Network (WAN), Internet, Naming Computers Connected to Internet, The Future of Internet Technology	
Unit-3	8 hours
Output Devices: Introduction, Video Display Devices, Flat Panel Displays, Printers, Audio Output Computer Software: Introduction, Operating System, Programming Languages, A Classification of Programming Languages	
Unit-4	8 hours
Data Organisation: Introduction, Organizing a Database, Structure of a Database, Database Management System, Example of Database Design, Non-text Databases, Archiving Databases Processing Numerical Data: Introduction, Use of Spreadsheets, Numerical Computation Examples	
Unit-5	8 hours
Some Internet Applications: Introduction, E-mail, Information Browsing Service, The World Wide Web, Information Retrieval from the World Wide Web, Other Facilities Provided by Browsers, Audio on the Internet, Pictures, Animation and Video via Internet Societal Impacts of Information Technology: Introduction, Privacy, Security and Integrity of Information, Disaster Recovery, Intellectual Property Rights, Careers in Information Technology	

Continuous Assessment Pattern

	Theory	
Components	Internal	SEE
Marks	50	50
Total Marks	100	

LLL512	Communicative English	L	T	P	C
Version 1.01	Date of Approval:	0	0	4	2
Pre-requisites/Exposure	English at Graduation Level				
Duration	12 sessions of 100 minutes each				

Course Objectives

1. To enhance knowledge of English grammar.
2. To help improve English communication skills.
3. To use quantitative methods for problem solving.

Course Outcomes

At the end of this course, the learner will be:

1. Construct grammatically correct sentences for effective communication.
2. Build confidence in public speaking.
3. Enhance self awareness for the purpose of self improvement.
4. Attaining initial knowledge of Quantitative Aptitude for problem solving.
5. Construct grammatically correct sentences for effective communication.
6. Build confidence in public speaking.
7. Enhance self awareness for the purpose of self improvement.

Unit-1

- Introduction and Goal Setting
- Extempore
- Role Play
- Movie Review
- Phonetics (Sounds)
- Phonetics (Transcription)
- Clear Pronunciation
- Tense Buster
- Group Discussion
- Group Presentation by Students

Unit-II

- Communication – Definition, Importance, Features- 7Cs and ABCs
- Basics of Grammar -Noun Pronoun, Subject Verb Agreement, Article, Prepositions, Punctuation Sentence Structure
- Vocabulary Building -The concept of Word Formation, Synonyms, antonyms, and standard abbreviations.
- Basic Writing Skills -Brainstorming, Structure, Organisation, Outline, Precision, Coherence (Connectedness)
- Paragraph writing: Types and Constituents, practice
- Essay Writing
- Précis (Selected Essays)
- Technical writing style and language
- Official Communication: Notice, Agenda, Minutes of Meeting, Memo, Official Note, Formal Letters, Brochure, Newsletter

Unit III: Quantitative Aptitude

- Data Interpretation
- Coding, decoding and Direction
- Blood Relation
- Binary Logic
- Cube and Dice
- Seating Arrangement

Course Catalogue

The English Language is an integral part of our daily lives and no professional interaction is complete without the usage of this language. The language knowledge will help students to widen their horizons and open new avenues for higher studies/research abroad and at home. It will also help them perform better in competitive examinations. The course comprises of lessons and practice sessions on communicative English and English aptitude, focusing on grammar, pronunciation and development of vocabulary which are imperative to succeed. The concepts of Vedic Maths and Number Systems will be reviewed and revised in the Quantitative Aptitude sessions.

Text Book

SLLL's own text book

Reference Books

1. Practical English Usage - ISBN: 019431197X
2. Learning Spoken English - ©2012 by Lynn Lundquist - ASIN: B0094XNOPW
3. Essential English Grammar: A Self-Study Reference and Practice Book for Elementary
4. 4. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
5. Quicker Maths , M Tyra

Mode of Evaluation: The performance of students is evaluated as follows:

Components	Practical	
	Internal	SEE
Marks	50	50
Total Marks	100	

Name of The Course	Programming in C Lab			
Course Code	MCA151			
Prerequisite	C language			
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

Objective is to introduce essential skills in programming for problem solving in the computer. Students are introduced with concepts of C programming, like -basic algorithm design approaches, functions, arrays, pointers, structures, files handling.

OUTCOMES:

COs :students will be able to:

- CO1: Identify appropriate algorithms and apply C language syntax for solving practical problems
- CO2: Convert problem solving strategies into C programs
- CO3: Analyse result and interpret data.
- CO4: Write C program and represent result
- CO5: Execute C program and organize lab report

List of Programs:

1. Write a program to convert temperature from degree centigrade to Fahrenheit. $^{\circ}\text{F} = ^{\circ}\text{C} * 9/5 + 32$
2. Write a program to compute the addition, subtraction, product, quotient and remainder of two given numbers.
3. Write a program to swap the values of two variables.
4. Write a program to compute net amount from the given quantity purchased and rate per quantity. Discount of 10 .is allowed if quantity purchased exceeds 100.
5. Write a program to print the sum of digit of a given number.
6. Write program to print the Fibonacci series up to a given number.
7. Write a program to print the prime numbers within a given number.
8. Write a program to check a given number is prime or not.
9. Write a program to check whether a no is an Armstrong number.
10. Write a program to determine and print the sum of the following harmonic series for a given value of n =1 +1/2+1/3+1/4+.....+1/n
11. Write a program to print the Floyds triangle


```

1
2 3
4 5 6

```
12. Write a program to read three integer values from the keyboard and display the output stating that they are the sides of right angled triangle.
13. Write a program to accept an year from the user and check whether the entered year is a leap year or not.
14. Write a program to print binary equivalent of an integer number.
15. Write a program to print the following pattern (take number of lines as input from the user).

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***
**
*
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16. Write a program to find out the length of a given string without using the library function strlen().
17. Write a program to print the reverse of a given string.
18. Write a program to check if a given string is palindrome or not. A string is said to be palindrome if the reverse of the string is equal to the string.
19. Write a program to count the number of vowels in a given string.
20. Write a program for addition of two nxm matrices

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
50	50	100

Name of The Course	Web Designing Lab			
Course Code	MCA152			
Prerequisite	Programming Knowledge			
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

The objective of this course is to:

1. Enable the students to understand web-based site planning, management and maintenance.
2. Explain the concept of developing advanced HTML, ASP, JavaScript, XML pages.
3. This course enables students to develop web sites which are secure and dynamic in nature.
4. Design and implement an internet database application using existing tools and techniques.

Course Outcomes

CO1	To develop web page using HTML with formatting, links, tables, list and frames.
CO2	To learn the basics of DHTML
CO3	To understand the basics of java script and how to embed it in HTML
CO4	To learn dynamic web page creation
CO5	To know the basics of VB script and ASP.net

Text Book (s)

1. Bates C, "Web Programming - Building Internet Application", Second Edition, Wiley-Dreamtech India Pvt. Ltd., 2002.
2. Pitter K, Amato S and Callahan J et al, —Every students guide to the Internet, Tata McGraw

Reference Book (s)

1. Deitel, -Java for programmers, Pearson Education
2. Ivan Bayross, HTML, DHTML, Java Script, Perl & CGI, BPB Publication.
3. Jackson, —Web Technologies, Pearson Education
4. Patel and Barik, Introduction to Web Technology & Internet, Acme Learning

Unit-1 Introduction	8 hours
<ul style="list-style-type: none"> The static home page must contain three frames. Top frame: Logo and the college name and to Home page, Login page, Registration page, Catalogue page and Cart page (the description these pages will be given below). Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link “MCA” the catalogue for MCA Books should be displayed in the Right frame. Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site. 	
Unit-2 DHTML and VB Script	8 hours
<ul style="list-style-type: none"> LOGIN PAGE: Login page must contain Login field, Password field, Submit and reset buttons. CATALOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following: 1. Snapshot of Cover Page. 2. Author Name. 3. Publisher. 4. Price. 5. Add to cart button 	
Unit-3 Java Script	8 hours
<ul style="list-style-type: none"> Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient. Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format. Write a JavaScript code that displays text “TEXT-GROWING” with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays “TEXT-SHRINKING” in BLUE color. Then the font size decreases to 5pt. 	
Unit-4 Cascading Style Sheets	8 hours
<ul style="list-style-type: none"> Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, and Name of the College, Branch, Year of Joining, and email id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document. 	
Unit-5 Active Server Page	8 hours
<ul style="list-style-type: none"> REGISTRATION PAGE: Create a “registration form “with the following fields 1) Name (Text field) 2) Password (password field) 3) E-mail id (text field) 4) Phone number (text field) 5) Sex (radio button) 6) Date of birth (3 select boxes) 7) Languages known (check boxes – English, Telugu, Hindi, Tamil) 8) Address (text area) 	

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
50	50	100

Semester II

Name of The Course	Statistical Methods & Numerical Techniques			
Course Code	MCA121			
Prerequisite	Mathematics			
Corequisite				
Antirequisite				
	L	T	P	C
	3	1	0	4

Course Objectives:

The objective of this course is to:

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

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

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
CO6	Understand the relevanceof the subject

Text Book (s)

1. K.S. Trivedi – Probability and Statistics with reliability, Queuing and Computer Science Applications – Prentice Hall India – 2001.

Reference Book (s)

2. A.M. Mood, F. Graybil and Boes – Introduction to Mathematical Statistics – McGraw Hill – 1974.
3. S.C. Gupta & V.K. Kapoor – Fundamentals of Mathematical Statistics – Sultan Chand & Sons.- 2002.

Unit I: Introduction to Probability	9 hours
Introduction to probability; Random Experiments, Sample Space, Events and their probabilities; Some basic results of 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 probability distributions: Binomial, Poisson. Continuous probability distributions: Exponential, Normal, Continuous distributions – Uniform, Normal, Exponential and Gamma distributions	
Unit- Statistical 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 $ax + b$, ax^2+bx+c , ab^x and ax^b 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

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Microprocessor			
Course Code	MCA122			
Prerequisite	Computer Fundamentals			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	2	4

Course Objectives:

The objective of this course is to:

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, NewDelhi, 2003.ISBN-0138027455, 4th Edition
- 2 Alan Clements, "Principles of Computer Hardware", Oxford University Press, 3rd Edition, 2003, ISBN-9780198564539

Unit-1 Introduction	9 hours
Introduction of Microcomputer System: An introduction . Introduction to 8086, CPU, I/O devices, clock, memory, bussed architecture, tristate logic, address bus, data bus and control bus.	
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 CPU Architecture, Machine language Instructions, concept of interpreter, compiler and debugger, Instruction execution timing. INSTRUCTION SET OF 8086: Addressing modes, Assembler instruction format, data transfer and arithmetic, branch type, loop, NOP & HALT, flag manipulation, Logical and shift and rotate instructions, Illustration of these instructions with example programs, Directives and operators.	
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

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Accounting & Financial Management			
Course Code	MCA123			
Prerequisite	Mathematics			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

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 "cost Accounting" 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

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

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Object Oriented Paradigm			
Course Code	MCA124			
Prerequisite	Computer Fundamentals			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of this course is to:

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++.
CO6	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. Bruce Eckel, Thinking in C++, Second Edition, Volume One, Pearson Education Asia, 2000.
2. Venugopal – Mastering C++ - Tata McGraw Hill-2001.

Unit-1 Introduction	8 hours
Object oriented programming concepts – objects-classes- methods and messages-abstraction and encapsulation-inheritance- abstract classes- polymorphism. Introduction to C++- objects-classes- constructors and destructors. Structures – Unions – Friend Functions –Friend Classes – Inline functions – Constructors -Copy Constructor– Destructors – Static Members – Scope Resolution Operator – Passing objects to functions – Function returning objects.	
Unit-2Function Overloading	8 hours
Arrays – Pointers – this pointer- void pointer in C++ – References – Dynamic Allocation Operators – free versus delete operator in C++, recursion in C++, FunctionOverloading – Data Abstraction in C++,interface in C++ , implement interfaces in C++,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 – Base Classes and Derived Classes – Protected Members – Casting Class pointers and Member Functions – Overriding – Public, Protected and Private Inheritance – Constructors and Destructors in derived Classes – Implicit Derived – Class Object To Base – Class Object Conversion - Composition vs. Inheritance - 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

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Data and File Structure			
Course Code	MCA125			
Prerequisite	C			
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 Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI
- 2 Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill
- 3 R. Kruse etal, "Data Structures and Program Design in C", Pearson Education
- 4 Lipschutz, "Data Structures" Schaum's Outline Series, TMH
- 5 G A V Pai, "Data Structures and Algorithms", TMH

Unit-1 Introduction	6 hours
Array Definition, Single and Multidimensional Arrays, application of arrays, String Operation, Ordered List, Sparse Matrices, Lower and Upper Triangular matrices, and tri-diagonal matrices.	
Unit-2 Link List and Stack	6 hours
Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Linked Representation of Stack, Operations Associated with Stacks, Applications of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.	
Unit-3 Queues	7 hours
Array and linked representation and implementation of queues, Operations on Queue:	

Create, Add, Delete, Full and Empty. Circular queue, Deque, and Priority Queue	
Unit-4 Tree and Graph	7 hours
Binary Trees – Binary search trees – Tree traversal – Expression manipulation – Symbol table construction – Height balanced trees – Minimum spanning trees, B-Trees, B+ Trees, Applications, Definition and Structure of AVL Tree, Operations on AVL Tree, Applications, Graphs – Representation of graphs – BFS, DFS – Topological sort – Shortest path problems. String representation and manipulations – Pattern matching, Applications.	
Unit-5 Sorting , Searching and File Structure	7 hours
Linear & Binary search, Hash table and Hashing. External Searching, Introduction to Static Hashing, Dynamic Hashing Techniques. Sorting: Bubble sort, Insertion sort, Selection sort, Quicksort, Shell sort, Merge sort. Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, Multi-level Indexing.	

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

LLL524	Corporate Communication	L	T	P	C
Version 1.01	Date of Approval:	0	0	4	2
Pre-requisites/Exposure	Completion of Semester 3				
Duration	18 sessions of 100 minutes each				

Course Objectives

1. To assess the current employability level of students.
2. To prepare students to perform effectively in Personal Interview.
3. To prepare the students for solving mathematical problems appearing in Placement Papers.

Course Outcomes

At the end of this course, the learner will be:

1. Enhance and practice employability skills required in the placement process using a simulated environment
2. Communicate effectively in a Personal Interview
3. Model interpersonal communication in a monitored environment
4. Enhance the ability of problem solving and decision making in short span of time

Course Catalogue

Practice makes a man perfect – so says the wise man. The course in this semester focuses on the practicing soft skills in a simulated corporate environment providing thematic learning. The students prepare and practice participation in mock interviews – general, technical and HR, which provide a holistic environment for a student's final preparation. The students practice data analysis and reasoning skills for the purpose of solving complicated mathematical problems.

Text Book

SLLL own text book

Reference Books

1. Delivering Employability Skills in the Lifelong Learning Sector by Ann Gravells, ISBN-10: 1844452956
2. Sample Papers of Various companies
3. Real world HR interviews from companies across various sectors like IT, ITES, Manufacturing, etc. in and around NCR region.

Course Content

Unit I: Thematic Learning- Employability Skills- Job Fair

12 lectures

- Introduction to Job Fair
- Resume Writing
- Personal Interview Concepts
- Mock Interviews
- Job Fair – Final Event

Unit II: Quantitative Aptitude

6 lectures

- Syllogism
- Logical Reasoning
- Paper Pattern Discussion

Mode of Evaluation: The performance of students is evaluated as follows:

	Theory	
Components	Internal	SEE
Marks	50	50
Total Marks	100	

Name of The Course	OBJECT ORIENTED PARADIGM LAB			
Course Code	MCA141			
Prerequisite	Programming Fundamentals			
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

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++.

Text Book (s)

1. Venugopal – Mastering C++ - Tata McGraw Hill-2001.

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.

Unit-1 Introduction	8 hours
1. Simple C++ programs to implement various control structures. a. if statement b. switch case statement and do while loop c. for loop d. while loop 2. Programs to understand structure & unions. a. structure b. union	
Unit-2 Function Overloading	8 hours
3. Programs to understand pointer arithmetic. 4. Functions & Recursion. a. recursion b. function 5. Inline functions.	
Unit-3 Operator Overloading	8 hours
6. Programs to understand different function call mechanism. a. call by reference b. call by value 7. Programs to understand storage specifiers. 8. Constructors & destructors	
Unit-4 Templates and Exception Handling	8 hours
9. Use of “this” pointer using class 10. Programs to implement inheritance and function overriding. a. multiple inheritance –access Specifiers b. hierarchical inheritance – function overriding /virtual Function 11. Programs to overload unary & binary operators as member function & non member function. a. unary operator as member function b. binary operator as non member function	
Unit-5 Input-Output Stream	8 hours
12. Programs to understand friend function & friend Class. a. friend Function b. friend class 13. Programs on class templates	

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
50	50	100

Name of The Course	Microprocessor Lab			
Course Code	MCAP143			
Prerequisite	Computer Fundamentals			
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

The objective of this course is to:

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, NewDelhi, 2003.ISBN-0138027455, 4th Edition**
- 2 Alan Clements, "Principles of Computer Hardware", Oxford University Press, 3rd Edition, 2003, ISBN-9780198564539

Unit-1 Introduction	9 hours
Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.	
2. Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers.	
Unit-2 Programming Techniques	9 hours
3. To perform multiplication and division of two 8 bit numbers using 8085.	
4. To find the largest and smallest number in an array of data using 8085 instruction set.	
Unit-3 Microprocessor Architecture	10 hours
5. To write a program to arrange an array of data in ascending and descending order.	
6. To convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085 instruction set.	
Unit-4 Interfacing	6 hours
7. To write a program to initiate 8251 and to check the transmission and reception of character.	
8. To interface 8253 programmable interval timer to 8085 and verify the operation of 8253 in six different modes	
Unit-5 Advance Microprocessor	6 hours
9. To interface DAC with 8085 to demonstrate the generation of square, saw tooth and triangular wave.	
10. Serial communication between two 8085 through RS-232 C port.	

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
50	50	100

Course Code: MCA142	Data Structure using C Lab	L	T	P	C
Version No. 01		0	0	2	1
Prerequisite/Exposure	C Language				
Co-requisites					

LIST OF EXPERIMENTS:

Course Code	Unit No.	Topic No.	Topic Name
MSCS1111	1	1	WAP to implement for the Array operations
MSCS1111	1	2	WAP to implement the STACK and its operations
MSCS1111	1	3	WAP to implement STACK application : Tower of Hanoi
MSCS1111	2	4	WAP to implement the Queue and its operations.
MSCS1111	2	5	WAP to implement the circular Queue and its operations.
MSCS1111	2	6	WAP to implement the DQueue and its operations.
MSCS1111	3	7	WAP to implement the Linked list and its operations.
MSCS1111	3	8	WAP to implement the BST.
MSCS1111	3	9	WAP to implement the BST insertion process.
MSCS1111	4	10	WAP to implement the Insertion sort.
MSCS1111	4	11	WAP to implement the Bubble sort.
MSCS1111	4	12	WAP to implement the Quick sort.
MSCS1111	5	13	WAP to implement the Merge sort.
MSCS1111	5	14	WAP to implement the Heap sort.
MSCS1111	5	15	WAP to implement the Graph.

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
50	50	100

LLL512	Communicative English	L	T	P	C
Version 1.01	Date of Approval:	0	0	4	2
Pre-requisites/Exposure	English at Graduation Level				
Duration	12 sessions of 100 minutes each				

Course Objectives

4. To enhance knowledge of English grammar.
5. To help improve English communication skills.
6. To use quantitative methods for problem solving.

Course Outcomes

At the end of this course, the learner will be:

8. Construct grammatically correct sentences for effective communication.
9. Build confidence in public speaking.
10. Enhance self awareness for the purpose of self improvement.
11. Attaining initial knowledge of Quantitative Aptitude for problem solving.
12. Construct grammatically correct sentences for effective communication.
13. Build confidence in public speaking.
14. Enhance self awareness for the purpose of self improvement.

Unit-1

- Introduction and Goal Setting
- Extempore
- Role Play
- Movie Review
- Phonetics (Sounds)
- Phonetics (Transcription)
- Clear Pronunciation
- Tense Buster
- Group Discussion
- Group Presentation by Students

Unit-II

- Communication – Definition, Importance, Features- 7Cs and ABCs
- Basics of Grammar -Noun Pronoun, Subject Verb Agreement, Article, Prepositions, Punctuation Sentence Structure
- Vocabulary Building -The concept of Word Formation, Synonyms, antonyms, and standard abbreviations.
- Basic Writing Skills -Brainstorming, Structure, Organisation, Outline, Precision, Coherence (Connectedness)
- Paragraph writing: Types and Constituents, practice
- Essay Writing
- Précis (Selected Essays)
- Technical writing style and language
- Official Communication: Notice, Agenda, Minutes of Meeting, Memo, Official Note, Formal Letters, Brochure, Newsletter

Unit III: Quantitative Aptitude

- Data Interpretation
- Coding, decoding and Direction
- Blood Relation
- Binary Logic
- Cube and Dice
- Seating Arrangement

Text Book

SLLL's own text book

Reference Books

6. Practical English Usage - ISBN: 019431197X
7. Learning Spoken English - ©2012 by Lynn Lundquist - ASIN: B0094XNOPW
8. Essential English Grammar: A Self-Study Reference and Practice Book for Elementary
9. 4. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
10. Quicker Maths , M Tyra

Mode of Evaluation: The performance of students is evaluated as follows:

Components	Practical	
	Internal	SEE
Marks	50	50
Total Marks	100	

Semester III

Name of The Course	Algorithm Analysis & Design			
Course Code	MCA211			
Prerequisite	Mathematics			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

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.

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. Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India.

Reference Book (s)

1. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia
2. Knuth E. Donald, Art of Computer Programming Sorting and Searching Vol3, Second Edition, Pearson Education.
3. Brassard Bratley, "Fundamental of Algorithms", PHI
4. A V Ahoetal, "The Design and analysis of Algorithms", Pearson Education

Unit-1 Introduction to Algorithms 8 hours
Introduction to Algorithms & Analysis- What is an algorithm? Mathematics for Algorithm Sets , Design of Algorithms,Growth of function, Complexity of Algorithms, Asymptotic Notations, Analyzing control statement, Loop invariant and the correctness of the algorithm, Sorting Algorithms and analysis: Bubble sort, Selection sort, Insertion sort, Shell sort Heap sort, Sorting in linear time : Bucket sort, Radix sort and Counting sort
Unit-2 Advance Data Structures 8 hours
Binary Search Trees, Threaded Binary Tree - AVL Tree, Splay Tree, Tries, B-Tree, B+ Tree, Red Black Trees, Binomial Heap, Fibonacci Heap.
Unit-3 Advance Design and Analysis Techniques 8 hours
Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis
Unit-4 Graph Algorithms 8 hours
Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow and Traveling Salesman Problem
Unit-5 Special Topics in AAD 8 hours
Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees-P, NP, NP-Complete and NP-Hard Problems– Approximation Algorithms for NP – Hard Problems – Traveling Salesman problem – Knapsack problem - Randomized Algorithms, String Matching

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Computer Architecture			
Course Code	MCA212			
Prerequisite	Computer Fundamentals			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

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/O control 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. And 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.

Unit-1 Central Processing Unit, Flip-flops,	8 hours
Central Processing Unit ,General Register and Stack Organization – Instruction Formats – -Instruction cycle, control logic gate-Addressing Modes– Data Transfer and manipulation – Program Control – RISC, what is flipflop,functionality of SR flipflop-D flipflop-JK flipflop-Tflip-flop	
Unit-2 Pipeline and Vector Processing	8 hours
Pipelining – Arithmetic Instruction and RISC Pipelining– Vector Processing – Array Processors.	
Unit-3 Computer Arithmetic	8 hours
Computer Arithmetic – Addition and Subtraction – Multiplication and Division Algorithms – Floating-Point and decimal Arithmetic operations.	
Unit-4 Input 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

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Programming in Java			
Course Code	MCA213			
Prerequisite	OOPS			
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, work with networking protocols using java with attractive GUI
CO5	Applet and Graphic Programming

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.

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, Finalizer 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. Types of Inheritance in Java, Inheriting Data members and Methods , Role of Constructors in inheritance , Overriding Super Class Methods, Use of “super”	
Unit-4 Multithreading and Exception Handling	8 hours
Exception Handling: Exception as Objects, Exception hierarchy, Exceptions & Errors ,Types of Exception, Control Flow In Exceptions, JVM reaction to Exceptions 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

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	DATABASE MANAGEMENT SYSTEMS			
Course Code	MCA214			
Prerequisite	Data Structure			
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	Understand the relational database theory, application of database system in real life.
CO2	Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
CO3	Learn and apply Structured query language (SQL) for database definition and database manipulation.
CO4	Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
CO5	Understand various issues of transaction processing and concurrency control mechanism.

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.

Unit-1 Introduction to Database Management System	8 hours
Introduction and application of DBMS, Data Independence, Database System Architectue- levels, Mapping, Database users and DBA, Entity- Relationship model, constraints keys, Design issues, E-R Diagram, Extended E-R features- Generalization, Specialization, Aggreration, Translating E-R model in to Relational model.	
Unit-2 Entity Relationship Model	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-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/PLSQL.	
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. Constraints, types of constrains, Integrity constraints, Introduction to views, data independence, security, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.	
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. Introduction to Distributed Database management System, Advantages of Data Distribution, Disadvantages of Data Distribution; Design of Distributed Databases, Data Replication, Data Fragmentation	

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Software Engineering			
Course Code	MCA222			
Prerequisite	Computer Fundamentals			
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. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill
2. Pankaj Jalote, Software Engineering, Wiley

Reference Book (s)

1. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
3. S. Desikan and G. Ramesh, "Software Testing: Principles and Practices", Pearson Education.
4. Aditya P. Mathur, "Fundamentals of Software Testing", Pearson Education.
5. Naik and Tripathy, "Software Testing and Quality Assurance", Wiley

Unit-1 Introduction	8 hours
Software Engineering-Software Process- Generic process model-Prescriptive process model-specialized, unified process-Agile Development-Agile Process- Extreme Programming- Other agile Process models-Software engineering Knowledge-core Principles-Principles that guide each framework Activity.	
Unit-2 Requirement Engineering Process	8 hours
Requirements Engineering-Establishing the Groundwork-Eliciting Requirements- Developing use cases-Building the requirements model-Negotiating, validating Requirements-Requirements Analysis-Requirements Modeling Strategies Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.	
Unit-3 Software Design	8 hours
Software design, Abstraction, Modularity, Software architecture, Effective modular design, Cohesion and Coupling, Architectural design and procedural design, Data flow oriented design, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures. Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. User Interface Design: User Interface design, Human factors, Human computer interaction, Human, Computer interface design, Interface design, Interface standards.	
Unit-4 Coding & Testing	8 hours
Coding: Language classes, Structured Programming, need for structured programming, Coding standards, Coding style, Maintainability of programs, Code documentation – Code efficiency Testing : A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging. Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing , Incremental vs Non incremental testing. Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suite Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards. Software Measurement and Metrics: Various Size Oriented Measures: Halstead’s Software Science, Function Point (FP) Based Measures, Bang Metrics, Cyclomatic Complexity Measures: -Control Flow Graphs, DD Graph.	
Unit-5 Maintenance	8 hours
Maintenance: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.	

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Theory of Computation			
Course Code	MCA217			
Prerequisite	Computer Fundamentals			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. The goal of this course is to provide students with an understanding of basic concepts in the theory of computation theory of computation theory of computation
2. Introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability.
3. Enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.
4. Introduce concepts in automata theory and theory of computation.
5. Identify different formal language classes and their relationships.
6. Design grammars and recognizers for different formal languages.

Course Outcomes

CO1	The goal of this course is to provide students with an understanding of basic concepts in the theory of computation theory of computation theory of computation
CO2	Introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability.
CO3	Enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.
CO4	Introduce concepts in automata theory and theory of computation.
CO5	Identify different formal language classes and their relationships.

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. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science : Automata, Languages and Co mputation", PHI.

Unit-1 Introduction	8 hours
Alphabets, Strings and Languages; Automata and Grammars, Finite Automata (FA), Deterministic finite Automata (DFA)-Formal Definition, State transition diagram, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Myhill-Nerode Theorem	
Unit-2 Regular Expressions	8 hours
Regular Expressions, FA and Regular Expressions, Proving Languages not to be regular, Closure Properties of Regular Languages, Equivalence and Minimization of Automata. Automata with output-Moore machine, Mealy machine, Finite automata, memory requirement in a recognizer, definition, union, intersection and complement of regular languages. Non Determinism Finite Automata, Conversion from NFA to FA, λ - Non Determinism Finite Automata Conversion of NFA- λ to NFA and equivalence of three Kleene's Theorem, Minimization of Finite automata Regular And Non Regular Languages – pumping lemma.	
Unit- Context Free Grammar	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, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata.	
Unit-4 Push Down Automata	8 hours
Push Down Automata (PDA): Description and definition, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA	
Unit-5 Turing Machine	8 hours
Basic model, definition and representation, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Recursive and recursively enumerable languages, Halting problem, Introduction to Undecidability, Undecidable problems about TMs.	

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Course Code: MCA243	Software Engineering Lab	L	T	P	C
Version No. 01		0	0	2	1
Prerequisite/Exposure	DBMS				
Co-requisites					

COURSE OBJECTIVE:

The course introduces the students to different types of operating systems. Operating system modules such as memory management, process management and file management are covered in detail.

COURSE OUTCOMES:

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

1. Implement multiprogramming, multithreading concepts for a small operating system.
2. Create, delete, and synchronize processes for a small operating system.
3. Implement simple memory management techniques.
4. Implement CPU and disk scheduling algorithms.
5. Use services of modern operating system efficiently
6. Implement a basic file system.

COURSE CONTENT:

1. Prepare a SRS document in line with the IEEE recommended standards.
2. Draw the use case diagram and specify the role of each of the actors.
Also state the precondition, post condition and function of each use case.
3. Draw the activity diagram.
4. Identify the classes. Classify them as weak and strong classes and draw the class diagram.
5. Draw the sequence diagram for any two scenarios.
6. Draw the collaboration diagram.
7. Draw the state chart diagram.
8. Draw the component diagram.
9. Perform forward engineering in java. (Model to code conversion)
10. Perform reverse engineering in java. (Code to Model conversion)
11. Draw the deployment diagram

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
50	50	100

Course Code: MCA251	Java Programming Lab	L	T	P	C
Version No. 01		0	0	2	1
Prerequisite/Exposure	Java				
Co-requisites					

COURSE OBJECTIVES

1. To be knowledgeable enough about basic Java language syntax and semantics to be able to successfully read and write Java computer programs.
2. To have obtained experience designing, implementing, testing, and debugging graphical user interfaces that respond to user events using Java;

COURSE OUTCOME

Upon successful completion of this course, students will be able to

1. Understand programming language concepts, particularly Java and object-oriented concepts.
2. Write, debug, and document well-structured Java applications.
3. Implement Java classes from specifications and effectively create and use objects from predefined class libraries.
4. Understand the behavior of primitive data types, object references, and arrays.
5. Apply decision and iteration control structures to implement algorithms.
6. Write simple recursive algorithms.
7. Implement interfaces, inheritance, and polymorphism as programming techniques and apply exceptions handling.

S.No.	Program List
1.	Write a Java Program to perform the arithmetic operations using switch case.
2.	Write a program to check the input character for uppercase, lowercase, no. of digits and other characters.
3.	Write a java program to find the greatest among three numbers.
4.	Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminant D and basing on value of D, describe the nature of root.
5.	Write a java program to implement binary search mechanism in use of following concepts (Operations, Expressions, Control-flow, Strings)
6.	Write a Java program that reads a line of integers and then displays each integer, and the sum of all the integers(Use String Tokenizer class of java.util)
7.	Write a Java Program for sorting a given list of names in ascending order.
8.	write a JAVA program to implement class mechanism. - Create a class, methods and invoke them inside main method.
9.	Write a java program to call a windows run time comments.
10.	Write a java program to calculate the area of square, rectangle and circle using method overloading.
11.	Write a java program to calculate the area of circle and cylinder using method overriding.

12.	Write a java program to calculate the area of rectangle, triangle and circle method abstract class.
13.	Write a java program that implements the concept of package creation.
14.	Write a java program that implements Interface concept using basic mathematical function.
15.	Write a java program to implements exception handling techniques and its concepts.
16.	Write a Java program that implements a multithreaded program has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd the third thread will print the value of cube of the number.
17.	Write a java program to implement Inter Process (Inter Thread) Communication between classes and there by using the mutual exclusion among them to display and produce the output.
18	Create an application for color class by using Applet.
19	Create an applet application using the Key Event class and KeyListener interface.
20	create an applet application for dialog box creation using Frames
21	Create an applet application (Mouse Events) for MouseListener and MouseMotionListener interface.
22	Create an application to display the calendar of a month based on users choice of month and year.

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
50	50	100

Name of The Course	DATABASE MANAGEMENT SYSTEMS LAB			
Course Code	MCA252			
Prerequisite	Data Structure			
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

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	Understand the relational database theory, application of database system in real life.
CO2	Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
CO3	Learn and apply Structured query language (SQL) for database definition and database manipulation.
CO4	Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
CO5	Understand various issues of transaction processing and concurrency control mechanism.

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. Elmasri Navrate: Data base Management System, Pearson Education.

Unit-1 Introduction to Database Management System	8 hours
Write relational algebra queries for a given set of relations. Perform the following: a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback).	
Unit-2 Entity Relationship Model	8 hours
Draw E-R diagram and convert entities and relationships to relation table for a given scenario. a. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college).	
Unit-3 Relational Model and SQL Query	8 hours
SQL PROGRAMMING A. Consider the following schema for a LibraryDatabase: BOOK (Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS (Book_id, Author_Name) PUBLISHER (Name, Address, Phone) BOOK_COPIES (Book_id, Branch_id, No-of_Copies) BOOK_LENDING (Book_id, Branch_id, Card_No, Date_Out, Due_Date) LIBRARY_BRANCH (Branch_id, Branch_Name, Address) Write SQL queries to 1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc. 2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun2017 3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation. 4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query. 5. Create a view of all books and its number of copies that are currently available in the Library.	
Unit-4 Normalization	8 hours
For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause), Queries involving- Date Functions, String Functions , Math Functions Join Queries- Inner Join, Outer Join Subqueries- With IN clause, With EXISTS clause.	
Unit-5 Overview of Transaction Management and Concurrency Control	8 hours
Write a PL/SQL program using FOR loop to insert ten rows into a database table	

Continuous Assessment Pattern

Internal Assessment (IA)		End Term Test (ETE)	Total Marks
50		50	100

Semester IV

Name of The Course	Computer Networks			
Course Code	MCA221			
Prerequisite	Computer Fundamentals			
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)

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. 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.
5. J. F. Kurose and K. W. Ross, Computer Networking: A Top Down Approach, 3rd Ed, Pearson India, 2005

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, – Digital transmission, Guided vs unguided media, Switching modes , Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences, Switching methods, ISDN, Terminal Handling.	
Unit-2 Data link layer	8 hours
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- <u>sliding window</u> – HDLC. - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11 – FDDI - SONET – Bridges	
Unit-3 Network Layer	8 hours
Network Layer - Point-to-Point Networks, routing, Congestion control, Internetworking: – Packet Switching and Datagram approach, network addressing mechanism-classful addressing , IP addressing methods: Subnetting, Routing, Distance Vector Routing, Link State Routing, Structure of a router. TCP / IP, IP packet, IPv4, IPv6.	
Unit-4 Transport Layer	8 hours
Design issues, Duties of transport layer: Multiplexing, De-multiplexing, connection management, Sockets, User Datagram Protocol (UDP), <u>Transmission Control Protocol (TCP)</u> , 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	8 hours
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	

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Operating Systems			
Course Code	MCA223			
Prerequisite	Computer Fundamentals			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of this course is to:

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.
CO6	Understand the concept of memory management and how it is realize in system.

Text Book (s)

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

Reference Book (s)

1. 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 Dhamdhare, “Operating Systems : A Concept based Approach”, 2nd Edition.

Unit-1 Fundamentals Concepts of OS	8 hours
Introduction, Types of Operating Systems, I/O structure ,General system architecture. Implementation of processes, Threads, Implementation of Thread in user space and kernel space ,Architecture of Android. Android Directory Structure, Structure of Manifest files, Android Development Tools.	
Unit-2 Process Management	8 hours
Process Management: Process concept, Process scheduling, CPU scheduling , Scheduling algorithms, , Inter process communication. Deadlocks, Component s of Android: Activities, Activity life cycle, Fragment, fragment lifecycle, Services, service life cycle, Broadcast receivers, Content providers, Intents.	
Unit-3 Memory Management	8 hours
Memory Management requirements, Memory partitioning: Fixed and Variable Partitioning, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit), Fragmentation, Swapping, and Paging. Segmentation, Demand paging, Virtual Memory: Concepts, management of VM, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing.	
Unit-4 I/O Control and Information Management	8 hours
Files protection – file system organisation – file operations – access methods – SQLite database, Creation of Database ,SQLite data type , insert /delete /update data in database , Sensors, Network connectivity , Bluetooth, Location Discovery , Geo Location, Graphics and Animation.	
Unit-5 Advanced Operating Systems	8 hours
Advanced Operating System, Basics of Network Operating System, Server Operating System, Real Time Operating System, Distributed operating system, Networked File system.	

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Cloud Computing			
Course Code	MCA227			
Prerequisite	OS			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of this course is to:

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	Learn knowledge of Cloud Computing.
CO2	Understand cloud computing delivery models.
CO3	Understand briefly cloud computing deployment models
CO4	Understand briefly cloud computing by deploying application on cloud.
CO5	Understanding of security and workload in cloud.
CO6	Assessment of the economics , financial, and technological implications for selecting cloudcomputing for own organization

Text Book (s)

1. *1.Cloud Computing: Principles and Paradigms*, Editors: RajkumarBuyya, JamesBroberg,
2. Andrzej M. Goscinski, *Wile*, 2011
3. *2. Cloud Computing First Steps: Cloud Computing for Beginners*, Ravi Shankar, NavinSabharwal, 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.

Unit-1 Introduction to Virtualization	7 hours
Definition, Characteristics, Components, Cloud provider, Anatomy of Cloud, Cloud deployment models, Cloud delivery models, Stepping stones for the development of cloud	
History, Importance of Virtualization in Cloud, Anatomy of Cloud, Cloud deployment models, Cloud delivery models, Stepping stones for the development of cloud, Grid Computing, Cloud Computing.	
Unit-2 Introduction to Cloud Computing	9 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	10hours
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	8 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

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

LLL622	Personality Development	L	T	P	C
Version 1.01	Date of Approval:	0	0	4	2
Pre-requisites/Exposure	Completion of Semester 3				
Duration	18 sessions of 100 minutes each				

Course Objectives

1. To assess the current employability level of students.
2. To prepare students to perform effectively in Personal Interview.
3. To prepare the students for solving mathematical problems appearing in Placement Papers.

Course Outcomes

At the end of this course, the learner will be:

5. Enhance and practice employability skills required in the placement process using a simulated environment
6. Communicate effectively in a Personal Interview
7. Model interpersonal communication in a monitored environment
8. Enhance the ability of problem solving and decision making in short span of time

Course Catalogue

Practice makes a man perfect – so says the wise man. The course in this semester focuses on the practicing soft skills in a simulated corporate environment providing thematic learning. The students prepare and practice participation in mock interviews – general, technical and HR, which provide a holistic environment for a student's final preparation. The students practice data analysis and reasoning skills for the purpose of solving complicated mathematical problems.

Text Book

SLLL own text book

Reference Books

4. Delivering Employability Skills in the Lifelong Learning Sector by Ann Gravells, ISBN-10: 1844452956
5. Sample Papers of Various companies
6. Real world HR interviews from companies across various sectors like IT, ITES, Manufacturing, etc. in and around NCR region.

Course Content

Unit I: Thematic Learning- Employability Skills- Job Fair

12 lectures

- Introduction to Job Fair
- Resume Writing
- Personal Interview Concepts
- Mock Interviews
- Job Fair – Final Event

Unit II: Quantitative Aptitude

6 lectures

- Syllogism
- Logical Reasoning
- Paper Pattern Discussion

Mode of Evaluation: The performance of students is evaluated as follows:

	Theory	
Components	Internal	SEE
Marks	50	50
Total Marks	100	

Course Code: MCA242	Computer Networks Lab	L	T	P	C
Version No. 01		0	0	2	1
Prerequisite/Exposure	PROGRAMMING				
Co-requisites					

COURSE OBJECTIVE:

This course covers the concepts of data communication and computer networks.

It comprises of the study of the standard models for the layered protocol architecture to communicate between autonomous computers in a network and also the main features and issues of communication protocols for different layers. Topics covered comprise of introduction to OSI and TCP/IP models also.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

1. Describe the hardware, software components of a network and their interrelations.
2. Compare OSI and TCP/IP network models.
3. Describe, analyze and compare different data link, network, and transport layer protocols.
4. Design/implement data link and network layer protocols in a simulated networking environment.

LIST OF EXPERIMENTS:

1. Write a socket Program for Echo/Ping/Talk commands.
2. Create a socket (TCP) between two computers and enable file transfer between them.
3. Create a socket (UDP) between two computers and enable file transfer between them.
4. Write a program to implement Remote Command Execution. (Two M/Cs may be used)
6. Write a code simulating ARP /RARP protocols.
7. Create a socket for HTTP for web page upload and download.
8. Write a program for TCP module implementation.(TCP services)
9. Write a program for File Transfer in client-server architecture using following methods. (a) RS232C (b) TCP/IP
10. Write a program to implement RMI (Remote Method Invocation)
11. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer. i. Shortest path routing ii. Flooding iii. Distance vector
12. Implement client in C and server in Java and initiate communication between them.

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
50	50	100

Course Code: MCA241	Operating Systems Lab	L	T	P	C
Version No. 01		0	0	2	1
Prerequisite/Exposure	Unix				
Co-requisites					

LIST OF EXPERIMENTS:

1. Write shell programs using 'case', 'then' and 'if' & 'else' statements.
2. Write shell programs using while, do-while and for loop statements.
3. Write a program to create a child process using fork(), exec() system calls and use other system calls.
4. Write a program to convert upper case to lower case letters of a given ASCII file.
5. Write a program to program to search the given pattern in a file.
6. Write a program to implementation of Signals in UNIX.
7. Write a program to simulate UNIX commands like ls, grep, cp.
8. Write a program to demonstrate FCFS and SJF process schedules on the given data.
9. Write a program to demonstrate CPU Priority and Round Robin Scheduling on the given burst time and arrival times.
10. Write a program to simulate Inter Process Communication using pipes.
11. Write a program to implementing Producer and Consumer problem using Semaphores.
12. Write a program to simulate Bankers Algorithm for Dead Lock Avoidance
13. Write a program to simulate Bankers Algorithm Dead Lock Prevention.
14. Write a program to simulate Paging Techniques of memory management.
15. Write a program to simulate FIFO, LRU, LFU Page replacement algorithms.
16. Write a program to simulate Sequential, Indexed, and Linked file allocation strategies.

SOFTWARE REQUIRED:

- Recommended to use Open Source Software like Fedora, Ubuntu, CentOS, etc...
- Recommended to write programs using C / C++ on Linux systems.

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
50	50	100

Course Code: MCA247	Computer Graphics Lab	L	T	P	C
Version No. 01		0	0	2	1
Prerequisite/Exposure	Programming Language				
Co-requisites					

LIST OF EXPERIMENTS:

Table of Contents	
S.No	LIST OF EXPERIMENTS:
1	Digital Differential Analyzer Algorithm
2	Bresenham's Line Drawing Algorithm
3	Midpoint Circle Generation Algorithm
4	Ellipse Generation Algorithm
5	Creating various types of texts and fonts
6	Creating two dimensional objects
7	Two Dimensional Transformations
8	Coloring the Pictures
9	Three Dimensional Transformations
10	Curve Generation
11	Simple Animations using transformations
12	Key Frame Animation

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
50	50	100

SEMESTER: V

Name of The Course	Data Warehousing & Data Mining			
Course Code	MCA311			
Prerequisite	Database Management System			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of this course is to:

1. Understand the Concept of data warehousing.
2. Understand the multidimensional data storage for system.
3. Learn OLAP techniques for data analysis.
4. Decision making through different algorithms in data Mining.
5. Make students understand the knowledge discoveries in database.

Course Outcomes

CO1	Design issues of data warehousing.
CO2	Learn various mining tools
CO3	Identify the real time problems and able to design solution using various mining tools.
CO4	Prediction of AI techniques Apply classification algorithms for prediction unknown Clusters
CO5	Classification of machine Apply various mining techniques on complex data objects
CO6	Describe advances and the latest trends in data mining and data warehousing.

Text Book (s)

1. Data Warehousing In the Real World; Sam Anahory& Dennis Murray; 1997, Pearson
2. Data Mining- Concepts & Techniques; Jiawei Han &MichelineKamber- 2001, Morgan Kaufmann.
3. Data Mining Techniques; ArunPujar; 2001, University Press; Hyderabad.
4. Data Mining; Pieter Adriaans&DolfZantinge; 1997, Pearson,
 5. Data Warehousing, Data Mining and OLTP; Alex Berson, 1997, McGraw Hill.
 6. Building the Data Warehouse; W.H. Inman, 1996, John Wiley & Sons.
 7. Developing the Data Warehouses; W.H Ionhman,C.Klelly, John Wiley & Son

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, modeling 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 Introduction to Data Mining	8 hours
Overview, Motivation (for Data Mining), Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction: -Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation	
Unit-4 Data Mining Techniques Classification and Prediction	8 hours
Basic issues regarding classification and prediction, Classification by Decision Tree, Bayesian classification, classification by back propagation, Associative classification, Prediction, Statistical-Based Algorithms, Decision Tree -Based Algorithms, , Rule-Based Algorithms, Other Classification Methods, Combining Techniques, Classifier Accuracy and Error Measures, Clustering, Association Rules,	
Unit-5 Miscellaneous topics	Applications and other Data mining techniques
8 hours	
Mining complex data objects, Spatial databases, Multimedia databases, Data Visualization, Time series and Sequence data, Text mining and Web Mining, Data mining vs big-data, Data mining in education, social media Data Mining methods	
Unit-6	Research
8 hours	
The advances and the latest trends in the course as well as the latest applications of the areas covered in the course. The latest research conducted in the areas covered in the course. Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums. Discussion on some of the latest products available in the market based on the areas covered in the course and patents filed in the areas covered.	

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Compiler Construction			
Course Code	MCA312			
Prerequisite	ToC			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of this course is to:

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	Have idea about how lexical analysis works.
CO3	Know about the working and generation of parsing in compiler
CO4	Understand use of type checking and L and S attributes of expression
CO5	Gain the knowledge about use of storage, activation tree and records in compiler
CO6	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*](#)

Unit-1 Introduction and Lexical analysis	8 hours
Analysis-synthesis model of compilation, various phases of a compiler, tool based approach to compiler construction, 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.	
Unit-2 Syntax Analysis	8 hours
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.	

Name of The Course	Artificial Intelligence			
Course Code	MCA313			
Prerequisite	Statics and Modeling			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of this course is to learn:

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	Understand different types of AI agents .
CO2	Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms) .
CO3	Understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving .
CO4	Know how to build simple knowledge-based systems .
CO5	Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information .
CO6	Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems .
CO7	Understand about AI research and Indexed publications.

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

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 AND REASONING	8 hours
Ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; predicate logic, situation calculus, description logics, reasoning with defaults, reasoning about knowledge, sample applications.	
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 -	
Unit 5: Clustering Algorithm and recurrent Networks	(8 Hrs)
k-means algorithm, k-nearest neighbour learning, weighted majority algorithm, Hopfield Net, Hamming net, Maxnet, Kohonenself organizing map, Principal component Analysis (PCA), Applications of machine learning	
Unit-6 Research	8 hours
The advances and the latest trends in the course as well as the latest applications of the areas covered in the course. The latest research conducted in the areas covered in the course. Applications: Time series in financial markets, Fraud detection, Portfolio Management.	

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Mobile Application Development			
Course Code	MCA315			
Prerequisite	XML, Java			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	2	4

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	Develop Basic and advance android app development for android devices.
CO4	Publish the app
CO5	Monetize from app development.
CO^	Understand about research and indexed publication.

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;

Unit-1 Introduction and Architecture of Android	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 Components 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	
Unit-6 Research	8 hours
<p>The advances and the latest trends in the course as well as the latest applications of the areas covered in the course.</p> <p>The latest research conducted in the areas covered in the course.</p> <p>Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums.</p> <p>Discussion on some of the latest products available in the market based on the areas covered in the course and patents filed in the areas covered.</p>	

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Mobile Application Development LAB			
Course Code	MCA352			
Prerequisite	XML, Java			
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

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	Develop Basic 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;

Unit-1 Introduction and Architecture of Android	5 hours
Project Based Lab	
Unit-2 User Interfaces	10 hours
Project Based Lab	
Unit-3 Component s of Android	10 hours
Project Based Lab	
Unit-4 Advance App Development	10 hours
Project Based Lab	
Unit-5 Security, Publishing, Monetizing	5 hours
Project Based Lab	

Continuous Assessment Pattern

Internal Assessment (IA)		End Term Test (ETE)	Total Marks
50		50	100

Name of The Course	Internet of Things			
Course Code	MCA318			
Prerequisite	Internet			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

To utilize various Embedded Technologies related to IoT, Sensor Networks, Communication Protocols, Accessing Resources and Services needed to perform machine to machine communications.

2. To understand the arduino board and Concepts for IoT environment.
3. To understand the raspberry pi board and integration with IoT environment.
4. To explore Modern IoT Trends in data analytics in cloud sensors
5. To understand and analyse IoT case studies and infer crucial information from that.

Course Outcomes

CO1	Elaborate the need for IoT and purpose of sensor network
CO2	Understand about Arduino board and basic programs to connect sensors and actuators.
CO3	Understand about Raspberry board and basic programs to connect sensors and actuators.
CO4	Configure and understand data analytics in cloud sensor
CO5	Case studies relevant to IoT and able to analyse / infer results from case studies

Text Book (s)

1. "Building the internet of things: implement new business models, disrupt competitors, and transform your industry", Kranz, M. (2018). Hoboken, NJ: Wiley.
2. "Enabling things to talk. Designing IoT solutions with the IoT Architectural Reference Model", Alessandro Bassi, Martin Bauer, Martin Fiedler, Thorsten Kramp, Rob van Kranenburg, Sebastian Lange, Stefan Meissner, Springer-Verlag Berlin An. (2016).

Reference Book (s)

1. "Internet of Things - A Hands-on Approach", Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 978817371954722.
2. "Getting Started with Raspberry Pi," Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
3. "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 st Edition, Francis daCosta, Apress Publications, 2013
4. "Getting Started with the Internet of Things", Cuno Pfister, O'Reilly Media, 2011, ISBN: 978-1-4493- 9357-1.

Unit-1 Introduction	8 hours
Introduction to IoT, Sensors, Actuators, Basics of Networking, Communication Protocols, Sensor Networks, Machine-to-Machine Communications.	
Unit-2 Arduino Programming	8 hours
Introduction to Arduino Programming, Arduino board, I/O functions, math library, pulse width modulation, Integration of Sensors, Integration of Actuators, interrupts, serial peripheral interface.	
Unit-3 Raspberry Programming	8 hours
Introduction to Python programming, list, dictionary, user defined modules, Introduction to Raspberry, Raspberry Architecture, raspbian Operating System, modules and components, GPIO pins, senseHat board, camera module, Implementation of IoT with Raspberry Pi	
Unit-4 Data Analytics in sensor cloud	8 hours
Cloud Computing, Sensor-Cloud, Fog Computing, smart Cities, Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT	
Unit-5 Technological Aggregation & Case Studies	8 hours
Case Study: Activity Monitoring, precision Agriculture, Healthcare System, Wearables, Open Data & IoT	

Continuous Assessment Pattern

	Theory	
Components	Internal	SEE
Marks	50	50
Total Marks	100	

ELECTIVE -1

MCA229	Open Source Programming with Python	L	T	P	C
Version1.1	Date of Approval:	3	0	0	3
Pre-requisites//Exposure	Any Programming Language				
co-requisites					

Course Objectives

The objective of this course is to:

1. Learn basic programming constructs –data types, decision structures, control structures in python.
2. Know how to use libraries for string manipulation and File handling.
3. Learn to use in-built data structures in python – Lists, Tuples, Dictionary.
4. Learn the fundamental principles of Object-Oriented Programming.
5. Solve problems through application of OO concepts and using Files/database.

Course Outcomes

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

1. Gain knowledge of Basic Programming with Python.
2. Familiarize with python string handling techniques and user defined functions.
3. Understand and use data structures like Lists, tuples and dictionaries.
4. Understand File handling.
5. Use object oriented programming techniques.
6. Understanding integration of database with python and develop applications using databases.

Catalog Description

This course introduces the student to the Python language. Upon completion of this class, the student will be able to write non trivial Python programs dealing with a wide variety of subject

matter domains. Topics include language components, the IDLE environment, control flow constructs, strings, I/O, collections, classes, modules, and regular expressions. The course is supplemented with many hands on labs using Windows.

Text Books

1. Tony Gaddis, Starting Out with Python, 3rd edition, Pearson
2. Y. Daniel Liang, Introduction to Programming Using Python, Pearson
3. Budd T A, Exploring Python , 2011, Tata McGraw Hill Education
4. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication

Reference Books

5. Downey, Allen B., Think Python: How to Think Like a Computer Scientist. O'Reilly, 2012. Obtain free PDF at <http://www.greenteapress.com/thinkpython/>
6. Python Programming: An Introduction to Computer Science (Second Edition) John Zelle, ISBN 978-1-59028-241-0-9, Franklin, Beedle & Associates Inc., 2004.

Course Content

Unit I: Introduction

6 Lecture hours

History , Features , Working with Python, Installing Python, basic syntax, interactive shell, editing, saving, and running a script.

The concept of data types; variables, assignments; immutable variables; numerical types; Arithmetic and Logical operators and Boolean expressions. Debugging, comments in the program; understanding error messages; Catching exceptions using try and except. Built-in functions – type(), id(), eval(), random, chr(), ord(); Conditional Statements : If, If-else, Nested if-else; Looping: For, While, Nested loops; Control Statements: Break, Continue, Pass;

Unit II: Function and Strings

6 Lecture hours

Functions in Python: Defining a function, Calling a function, Types of functions, Function Arguments, Global and local variables.

String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa.

Unit III: Lists, Tuples and Dictionaries

7 lecture hours

Basic List operators, iterating over a list, replacing, inserting, removing an element; searching and sorting lists, calculating the sum and average of items in a list ; Tuples - sequence of values , immutability, Comparing tuples, Tuple assignment: Dictionary- Store data as key-value pairs in dictionaries, search for values, change existing values, add new, key-value pairs, and delete key-value pairs, nesting objects, sorting, dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.

Unit IV : Files and Regular Expressions

7 lecture hours

Manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; regular expressions

Unit V: Object Oriented Programming and Database Connectivity 7 Lecture hours

Class, Objects, Class variables, Instance variables, Types of methods, Inheritance, Database Introduction, Connecting to database, Executing queries, Handling error, Sending email,

Unit VI: Web Programming : 7 Lecture hours

Fetching data from html forms, sending automated Email, Cookies, Sessions.

Mode of Evaluation: Written Examinations, Quizzes, Assignments.

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Course Code: MCA246	Open Source Programming with Python Lab	L	T	P	C
Version No. 01		0	0	2	1
Prerequisite/Exposure	Python Language				
Co-requisites					

S.No	List of Python Program
1	Python program to add two numbers
2	Python Program for factorial of a number
3	Python Program for simple interest
4	Python Program for compound interest
5	Python Program to check Armstrong Number
6	Python Program for Program to find area of a circle
7	Python program to print all Prime numbers in an Interval
8	Python program to check whether a number is Prime or not
9	Python Program for n-th Fibonacci number
10	Python Program for Fibonacci numbers
11	Python Program for How to check if a given number is Fibonacci number?
12	Python Program for n\`th multiple of a number in Fibonacci Series
13	Program to print ASCII Value of a character
14	Python Program for Sum of squares of first n natural numbers
15	Python Program for cube sum of first n natural numbers
16	Python Ways to find length of list
17	Python Ways to check if element exists in list
18	Python Reversing a List
19	Python Cloning or Copying a list
20	Python Count occurrences of an element in a list

21	Python program to find sum of elements in list
22	Python Multiply all numbers in the list
23	Python program to find smallest number in a list
24	Python program to find largest number in a list
25	Python program to find second largest number in a list
26	Python program to find N largest elements from a list
27	Python program to print even numbers in a list
28	Python program to print odd numbers in a List
29	Python program to print all even numbers in a range
30	Python program to print all odd numbers in a range
31	Python program to count Even and Odd numbers in a List
32	Python program to check if a string is palindrome or not
33	Python program to split and join a string
34	Python Program for Binary Search (Recursive and Iterative)
35	Python Program for Linear Search
36	Python Program for Insertion Sort
37	Python Program for Recursive Insertion Sort
38	Python Program for QuickSort
39	Python Program to Reverse a linked list
40	Python Program for Find largest prime factor of a number
41	Python Program for Efficient program to print all prime factors of a given number
42	Python Program for Product of unique prime factors of a number
43	Python Program for Find sum of odd factors of a number
44	Python Program for Check if count of divisors is even or odd
45	Python Program for Find minimum sum of factors of number
46	Python Program for Difference between sums of odd and even digits
47	Python Program for Find sum of even factors of a number
48	Python Program for Check if all digits of a number divide it
49	Python program to convert float decimal to Octal number
50	Python program to convert floating to binary

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
50	50	100

Name of The Course	Advanced Database Management Systems			
Course Code	MCA226			
Prerequisite	Database Management Systems			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

COURSE OBJECTIVES:

- To learn the modeling and design of databases.
- To acquire knowledge on parallel and distributed databases and its applications.
- To study the usage and applications of Object-Oriented database
- To understand the principles of intelligent databases.
- To understand the usage of advanced data models.
- To learn emerging databases such as XML, Cloud and Big Data.
- To acquire inquisitive attitude towards research topics in databases.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to

- Select the appropriate high performance database like parallel and distributed database
- Model and represent the real world data using object oriented database
- Design a semantic based database to meaningful data access
- Embed the rule set in the database to implement intelligent databases
- Represent the data using XML database for better interoperability
- Handle Big data and store in a transparent manner in the cloud
- To solve the issues related to the data storage and retrieval

REFERENCES:

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
5. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill, Third Edition 2004

UNIT I PARALLEL AND DISTRIBUTED DATABASES

8 Hours

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems- Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Case Studies

UNIT II OBJECT AND OBJECT RELATIONAL DATABASES

8 Hours

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL/Oracle – Case Studies.

UNIT III INTELLIGENT DATABASES

8 Hours

Active Databases: Syntax and Semantics (Starburst, Oracle, DB2)- Taxonomy- Applications- Design Principles for Active Rules- Temporal Databases: Overview of Temporal Databases- TSQL2- Deductive Databases: Logic of Query Languages – Datalog- Recursive Rules- Syntax and Semantics of Datalog Languages- Implementation of Rules and Recursion- Recursive Queries in SQL- Spatial Databases- Spatial Data Types- Spatial Relationships- Spatial Data Structures-Spatial Access Methods- Spatial DB Implementation.

UNIT IV ADVANCED DATA MODELS

8 Hours

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Multimedia Databases- Information Retrieval- Data Warehousing- Data Mining- Text Mining.

UNIT V EMERGING TECHNOLOGIES

8 Hours

XML Databases: XML-Related Technologies-XML Schema- XML Query Languages- Storing XML in Databases-XML and SQL- Native XML Databases- Web Databases- Geographic Information Systems- Biological Data Management- Cloud Based Databases: Data Storage Systems on the Cloud- Cloud Storage Architectures-Cloud Data Models- Query Languages- Introduction to Big Data-Storage-Analysis.

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

ELECTIVE-2

Name of The Course	Cyber Security			
Course Code	MCA361			
Prerequisite	Wireless technologies and internet			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. Identify the key components of cyber security network architecture
2. Apply cyber security architecture principles
3. Describe risk management processes and practices

Course Outcomes

CO1	Understand the concept of Data and the information. To know how the information system can be developed keeping in mind the security of data over the internet.
CO2	Knowledge on security threats to the data and Applications developed and the e-commerce like Trojan horses, Worms, Bombs etc.
CO3	Compare Cryptography Algorithms, different categories of Cryptography algorithms
CO4	Analysis of Encryption and Decryption Techniques
CO5	Knowledge of different methods of information Security, Data Security, hardware and software security.
CO6	Describe advances and the latest trends in Cyber security.

Text Book (s)

1. Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill.
2. CHANDER, HARISH, "Cyber Laws And It Protection", PHI Learning Private Limited, Delhi, India

Reference Book (s)

1. Charles P. Pfleeger, Shari Lawerance Pfleeger, "Analysing Computer Security", Pearson Education India.
2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.

Dr. Surya PrakashTripathi, RitendraGoyal, Praveen kumarShukla , "Introduction to Information Security and Cyber Law" Willey Dreamtech Press.

Unit-1 Introduction to Information System	8 hours
Introduction to information systems, Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, and Cyber Security	
Unit-2 Information Security Threats	8 hours
Introduction to information systems, Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, and Cyber Security	
Unit-3 Cryptography Techniques	8 hours
Cryptography Algorithms and Techniques- Rail fence Algorithm, RSA Algorithm, Diffie- Hellman Key Exchange Algorithm, Simple Data Encryption Standard (SDS) Algorithm, Caesar Cipher, Hill Cipher, and Play Fair Cipher.	
Unit-4 Cryptography Techniques	8 hours
Application security (Database, E-mail and Internet), Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets, Access Control, Backup Security Measures Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design.	
Unit-5 Information Security Policies and Cyber Law	8 hours
Security Policies, WWW policies, Email Security policies, Policy Review Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement of the Policies. Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law.	
Unit-6 Research	8 hours
The advances and the latest trends in the course as well as the latest applications of the areas covered in the course. The latest research conducted in the areas covered in the course. Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums. Discussion on some of the latest products available in the market based on the areas covered in the course and patents filed in the areas covered.	

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100

Name of The Course	Big Data			
Course Code	MCAP364			
Prerequisite	Data Warehousing and Data Mining			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of this course is to:

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	Students should know about design issues of Hadoop Architecture.
CO2	Students should learn various techniques for big data analytics.
CO3	Students able to identify the real time problems and able to design solution using various big data analytics techniques.
CO4	Students use prediction of supervised and unsupervised learning.
CO5	Students can use classification of clustering algorithms

Text Book (s)

1. Seema Acharya ,Subhashini Chellappan ,“Big Data and Analytics (WIND)”, Wiley, ISBN: 8126554789, 2015.
2. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
3. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill, 2012.
4. Alberto Cordoba, “Understanding the Predictive Analytics Lifecycle”, Wiley, 2014.

Reference Book (s)

1. Tom White, “HADOOP: The definitive Guide” , O Reilly 2012. 6 IT2015 SRM(E&T)
2. VigneshPrajapati, “Big Data Analytics with R and Haoop”, Packet Publishing 2013.
3. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press, 2014.
4. Jay Liebowitz, “Big Data and Business analytics”,CRC press, 2013.

Unit-1 Introduction to Big Data	8 hours
Classification of Digital Data, Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Classification of Analytics , Top Challenges Facing Big Data, Responsibilities of data scientists, Big data applications in healthcare, medicine, advertising.	
Unit-2 Hadoop Architecture	8 hours
Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance, Managing Resources and Applications with Hadoop YARN. Interacting with Hadoop Ecosystem. Introduction to Hive, Introduction to Pig.	
Unit-3 Introduction to NoSQL & Hadoop	8 hours
Introduction to NoSQL Advantages of NoSQL, SQL versus No SQL, Introduction to Hadoop, Features of Hadoop, Hadoop Versions, Hadoop Ecosystems, Hadoop Distributions, Hadoop Versus SQL.	
Unit-4 Types of Analytics & Techniques	8 hours
Open source technology for Big Data Analytics – cloud and Big Data – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics In-Memory Analytics, In-Database Processing, Symmetric Multiprocessor System, Massively Parallel Processing, Shared Nothing Architecture, Open source Analytical Tools, Sampling Techniques, Data classification, Tabulation, Frequency and Graphic representation, Measures of central value - Arithmetic mean, Geometric mean, Harmonic mean, Mode, Median, Regression Analysis, Correlation analysis.	
Unit-5 Predictive Analysis	8 hours
Predictive Analytics, Supervised, Unsupervised learning, Clustering Techniques, Hierarchical, K-Means, Basics of R, Working of R - Creating, listing and deleting the objects in memory - The on-line help Data with R Objects, R data Frames and Matrices, Reading data in a file , Saving data, Generating data, Manipulating objects Graphics with R Managing graphics , Graphical functions	

Continuous Assessment Pattern

	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
	50	50	100