



GALGOTIAS UNIVERSITY

Syllabus of

Course Book MCA 2015-18

Name of School: School of Computing Science & Engineering

Department: Computer Application & Information Science

Year: 2015-18

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	LLL112	Basic English	0	0	4	2		50	50
		Total Credits:				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	1	0	4		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							27
Semester IV									

Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C		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	MCA247	Computer Graphics Lab	0	0	2	1		50	50
8	MCA242	Computer Network Lab	0	0	2	1		50	50
9	MCA241	Operating System Lab	0	0	2	1		50	50
10		Program Elective-I Lab	0	0	2	1		50	50
		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	0	0	3		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	3	0	0	3		50	50
6	MCA350	Project-1	0	0	0	5		50	50
7		Elective-2	3	0	0	3		50	50
8									
		Total Credits							23

Semester VI

Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MCA360	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	MCA229	Open Source Programming with Python(Lab- MCA246)	3	0	1	4		50	50
2	MCA212	Programming in C# with Visual Studio .NET Framework	3	0	0	3		50	50
3	MCA230	Programming in C# with Visual Studio .NET Framework Lab	0	0	2	1		50	50
4	MCA231	Advance Programming in Java	3	0	1	4		50	50

Basket-2

Sl No	Course Code	Name of the Elective					Assessment Pattern		
			L	T	P	C		MTE	ETE
1	MCA361	Software Testing and Quality Assurance	3	0	0	3		50	50
2	MCA362	Advance DBMS	3	0	0	3		50	50
3	MCA363	Multimedia Systems	3	0	0	3		50	50
	P5045	BIG DATA	3	0	0	2		50	50
	MCA537	BIG DATA 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

Partial order relation, poset - Lattices, Hasse diagram - Boolean algebra

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
	Understanding the concept of structures and union.
	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 Number System13 hours
Identifiers – Keywords– Data Types – Data Type Conversions – Operators – Conditional Controls – Loop Controls– Input/Output operations, switch case statement
Unit-2Function 8 hours
Introduction to modular programming, writing functions, formal parameters, actual parameters Pass by Value, Recursion, Arrays as Function Parameters structure, union, Storage Classes, Scope and life time of variables, simple programs using functions
Unit-3Arrays and Strings 8 hours
Arrays Declaration and Initialization, 1-Dimensional Array, 2-Dimensional Array. String processing: In built String handling functions - strlen, strcpy, strcat and strcmp, puts, gets. Linear search program, bubble sort program, simple programs covering arrays and strings
Unit-4Structure and Unions7 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-5File Handling4hours
Character I/O – String I/O – Formatting input/output – File I/O – Error Handling during I/O – Command line Arguments

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	None			
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 System – Converting numbers from one base to another – Complements – Binary Codes – Integrated Circuits – Boolean algebra – Properties of Boolean algebra – Boolean functions – Canonical and Standard forms – Logical Operations – Logic gates – Karnaugh Map up to 6 variables – Don't Care Condition – Sum of Products and Products of Sum simplification – Tabulation Method.	
Unit-2 Combinational Circuit	8 hours
Adder – Subtractor – Code Converter – Analyzing a Combinational Circuit – Multilevel NAND and NOR circuits – Properties of XOR and equivalence function – Binary Parallel Adder – Decimal Adder – Magnitude Comparator – Decoders – Multiplexers – ROM – PLA.	
Unit-3 Sequential Circuit	8 hours
Flip Flops – Triggering of flip-flops – Analyzing a sequential circuit – State reduction – excitation tables – Design of sequential circuits – Counters – Design with state equation – Registers – Shift Registers – Ripple and synchronous Counters.	
Unit-4 Memory Unit	8 hours
Memory Unit – Bus Organization – Scratch Pad Memory – ALU – Design of ALU – Status Register – Effects of Output carry – Design of Shifter – Processor Unit – Microprogramming – Design of specific Arithmetic Circuits.	
Unit-5 Micro-Program Control	8 hours
Accumulator – Design of Accumulator – Computer Configuration – Instructions and Data formats – Instruction sets – Timing and control – Execution of Instruction – Design of Computer – H/W Control – PLA control and Micro-program control.	

Continuous Assessment Pattern

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

Name of The Course	Web Designing			
Course Code	MCAS1130			
Prerequisite	Programming Language			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	3	4

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

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"> 1. Eric M. Schurman William J. Pardi.-Dynamic HTML in Action, 2nd Edition, Web Technology-1999. 2. Microsoft Visual Interdev 6.0, Microsoft Press-1998. 3. William Martiner -VB Programmer's Guide to Web Development,- 1999. 4. Ivan Bayross -Web Enabled Commercial Application Development Using HTML, DHTML, Java Script, Perl, CGI-2000. 5. 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	MCA512			
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	<i>Compare and analyze the fundamental structures of computer networks and the Internet.</i>
CO3	<i>Explain about various input output devices & operating System</i>
CO4	<i>Learn about database, its structure & spreadsheets</i>
CO5	<i>Learn about Internet applications, Security, privacy and IPR</i>

Text Book (s)

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

Unit-1	8 hours
<p>Data and Information: Introduction, Types of Data, A Simple Model of a Computer, Data Processing Using a Computer, Desktop Computer</p> <p>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</p>	
Unit-2	8 hours
<p>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</p> <p>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</p>	
Unit-3	8 hours
<p>Output Devices: Introduction, Video Display Devices, Flat Panel Displays, Printers, Audio Output</p> <p>Computer Software: Introduction, Operating System, Programming Languages, A Classification of Programming Languages</p>	
Unit-4	8 hours
<p>Data Organisation: Introduction, Organizing a Database, Structure of a Database, Database Management System, Example of Database Design, Non-text Databases, Archiving Databases</p> <p>Processing Numerical Data: Introduction, Use of Spreadsheets, Numerical Computation Examples</p>	
Unit-5	8 hours
<p>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</p> <p>Societal Impacts of Information Technology: Introduction, Privacy, Security and Integrity of Information, Disaster Recovery, Intellectual Property Rights, Careers in Information Technology</p>	

Continuous Assessment Pattern

	Theory	
Components	Internal	SEE
Marks	50	50
Total Marks	100	

LLL112/SLMC5001	Basic 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:

	Practical	
Components	Internal	SEE
Marks	50	50
Total Marks	100	

Name of The Course	Programming in C Lab			
Course Code	MCA151			
Prerequisite	Computer Fundamentals			
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 $n = 1 + 1/2 + 1/3 + 1/4 + \dots + 1/n$
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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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 $n \times m$ matrices

Continuous Assessment Pattern

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

Name of The Course	Web Design 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	Matematics			
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). Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Methods of finding complex roots, Muller's method, Rate of convergence of Iterative methods, Polynomial Equations.	
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	None			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

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 to 8086 – Microprocessor architecture – Addressing modes – Instruction set and assembler directives – Assembly language programming – Modular Programming – Linking and Relocation – Stacks – Procedures – Macros	
Unit-2 Programming Techniques	9 hours
Standard program structures – Simple Programs – Jumps – While-do – repeat-until – Delay loops. Strings – Procedures – Macros – Instruction Descriptions – Assembler Directives.	
Unit-3 Microprocessor Architecture	10 hours
8086 Microcomputer – Observing Bus signals – Minimum mode System – Troubleshooting – 8086 interrupts – Interrupt Applications – Programmable timer/Counter – Interrupt Controller.	
Unit-4 Interfacing	6 hours
Parallel Ports – Handshaking – Interfacing, Digital Devices, Analog Interfacing.	
Unit-5 Advance Microprocessor	6 hours
DMA – DRAMS – Cache Memories – Co-Processors – EDA Tools – 80286, 80386 and 80486, Pentiums microprocessors	

Continuous Assessment Pattern

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

Name of The Course	Accounting & Financial Management			
Course Code	MCA123			
Prerequisite	None			
Corequisite				
Antirequisite				
	L	T	P	C
	3	1	0	4

Course Objectives:

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

Course Outcomes

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

Text Book (s)

1. Maheswari "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	None			
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 Paradigm - Elements of Object Oriented Programming – Merits and Demerits of OO Methodology – C++ fundamentals – Data types, Operators and Expressions, Control flow, Arrays, Structure and Functions.	
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-3Operator Overloading	8 hours
Operator Overloading – Member Operator Function – Friend Operator Function – Overloading some special operators – Overloading [], (), —> and comma operator – Inheritance – Types of Inheritance – Protected members – Virtual Base Class Polymorphism – Virtual Functions – Pure virtual functions	
Unit-4Templates and Exception Handling	8 hours
Class templates and generic classes – Function templates and generic functions – Overloading a function template – power of templates – Exception Handling – Derived class exception – Exception handling options – terminate() and unexpected() – uncaught_exception() function.	
Unit-5Input-Output Stream	8 hours
I/O Streams – formations I/O with ios class functions and manipulators – overloading << and >> – creating own manipulator – File I/O – Name spaces – the std name space – conversion functions – Array based I/O – An overview of the STL – The container classes – General theory of operation – Vectors.	

Continuous Assessment Pattern

	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
Data Structures Basics: Structure and Problem Solving, Data Structures, Data Structure Operations, Algorithm: Complexity and Time- Space Tradeoff - Algorithm – Complexity Notations: Mathematical Notation and Functions, Algorithm Notation, Control Structures, Complexity of Algorithm, Rate of Growth- Asymptotic Notation.
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 – Spanning trees - Minimum spanning trees, B-Trees, B+ Trees – Rooted Tree Applications of Graphs – Representation of graphs – BFS, DFS – Topological sorting – Weighted Shortest Path - Dijkstra’s Algorithm - Shortest path problems. String representation and manipulations – Pattern matching.
Unit-5 Sorting ,Searching and File Structure 7 hours
Linear & Binary search, Hash table and Hashing. Sorting: Bubble sort, Insertion sort, Selection sort, Quicksort, Shellsort, Mergesort. 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	Campus to Corporate	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

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", Prentice 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- Introduction: Problem solving -- adding 2 n-bit numbers, multiplication as repeated addition. Running time analysis - big-oh, theta, big-omega, and introduce little-oh and little-omega - Worst case and average case complexity Basic paradigms with illustrative examples -- incremental design - incremental sorting - decremental design - GCD with discussion on input size, factorial and pruning - order statistics
Unit-2 Advance Data Structure 8 hours
Advanced Data Structure: Binary Search Trees, Red Black Trees, Augmenting Data Structure Binomial Heap, B-Tree, Fibonacci Heap, and Data Structure for Disjoint Sets, Union-find Algorithm, Dictionaries and priority Queues.
Unit-3 Advance Design and Analysis Techniques 8 hours
Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis, Boyer Moore algorithm
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
Randomized Algorithms, String Matching, NP-Hard and NP-Completeness Approximation Algorithms, Sorting Network, Matrix Operations, Polynomials & FFT, Number Theoretic Algorithms.

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 - Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multicomputers, Multivector and SIMD Computers, PRAM and VLSI models, Architectural development tracks	
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

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.	
Unit-4 Multithreading and Exception Handling	8 hours
Exception Handling: Exception as Objects, Exception hierarchy, Try, Catch, Finally, Throw. Multi threading: 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-2Entity 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-3Relational 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-4Normalization	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, Normalization Algorithms: Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs	
Unit-5Overview of Transaction Management and Concurrency Control	8 hours
Overview of Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of transaction, Lock Based Concurrency Control, Performance Locking, Transaction Support in SQL, Introduction to Crash recovery. Concurrency Control: Serializability, and recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques, Concurrency without Locking.	

Continuous Assessment Pattern

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
Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process - Software Development Life Cycle (SDLC) Models: WaterFall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models, Selection of Software Process models.	
Unit-2 Requirement Engineering Process	8 hours
Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. 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: Human–Computer Interface – Characteristics Of Graphics Interface – Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.	
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
Introduction to formal proof – Additional forms of Proof – Inductive Proofs – Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – Finite Automata with Epsilon Transitions Alphabets, Strings and Languages; Automata and Grammars	
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. Normal Forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.	
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

LLL514	Numerical Aptitude	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:

Components	Theory	
	Internal	SEE
Marks	50	50
Total Marks	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-1Introduction	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-2Data 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-3Network 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-4Transport 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-5Application 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	2	4

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 Dhamdhere, “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 Dhamdhere, “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
paging, segmentation , page segmentation, virtual memory – demand paging – page replacement and algorithms– disk scheduling , User interface :Views, Views Group, Widgets - Button, EditText, CheckBox, ToggleButton, Spinner, Picker, Layouts, Styles, Themes, Events, Event listener,	
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 , inseret /delete /update data in database , Sensors, Network connectivity , Bluetooth, Location Discovery , Geo Location, Graphics and Animation.	
Unit-5 Distributed Operating Systems	8 hours
Distributed operating system concept Real Time Operating Systems: Introduction to Real Time Operating Systems, Networked File system , Publishing on Google Play, Monetization strategies, Application promotion strategies, Using Google Analytics, App development , Sending /Receiving SMS/MMS ,News group	

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
Traditional IT Infrastructure, Benefits of Virtualization, Compare. Study of Hypervisors, VM	
Unit-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-3Cloud 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-4Cloud 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-5Design & 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

MCA224	Computer Graphics	L	T	P	C
Version No. 1.0		3	0	0	3
prerequisite	Basic Computer Application, Analytical Skills, C programming language.				
co-requisites	“C-Programming”				
Course Coordinator					

Course Objectives

The objective of this course is to:

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

Course Outcomes

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

1. Learn and understand the concept of graphics, graphics system and its components.
2. Learning concept of graphical device handling.
3. Understanding the fundamentals of graphics problem solving and able to implement graphics package and also write algorithms for graphics drawing.
4. Develop GUI applications, Video games and other software with high level abstractions.
5. Develop graphics routines for text handling and apply them to write programs/software.
6. Hands on experience of important graphic tools and a sound background for more graphics work.

Catalog Description

This course provides a thorough coverage of the properties of graphics problem solving, the fundamentals of computer graphics and graphics programming in C language. It covers line, circle, ellipse, bspline, bezier curve drawing and two dimensional transformation and clipping. It also covers three dimensional viewing, modeling, transformation and fractal programming.

Reference Books

1. Donald Hearn and M Pauline Baker, "Computer Graphics C Version", Pearson Education
2. Heam Donald, Pauline Baker M: "Computer Graphics", PHI 2nd Edn. 1995.
3. Harrington S: "Computer Graphics - A Programming Approach", 2nd Edn. Mc GrawHill.
4. Shalini Govil-Pai, Principles of Computer Graphics, Springer, 2004.

Course Content

Module I: Introduction

8 lecture hours

Overview of Graphics Systems: Video display devices, Raster-Scan System, Random-Scan Systems. Random-Scan Systems Graphics monitors and work stations. Input devices: Hard copy devices. Graphics software.

Output primitives: Line drawing algorithms circle generation algorithms. Ellipse Generating Algorithm. Pixel Addressing. Filled-Area Primitives. Fill Area Function, Cell Array, Character Generation.

Module II: Transformation

8 lecture hours

Attributes of Output Primitives: Line Attributes, Curve Attributes, Color and Gray-Scale levels.

Area-Fill Attributes, Character Attributes. Bundled attributes. Inquiry functions.

Two-dimensional geometric transformations: Basic transformations. Homogenous coordinates, composite transformations, other transformations. Affine transformations, transformation functions, Roster methods for transformations.

Module III: Viewing and Clipping

8 lecture hours

Two-dimensional viewing: The viewing pipeline, viewing transformation, viewing functions. Line clipping, Cohen Sutherland line clipping, Liang Barsky line clipping
Polygon clipping: Sutherland-Hodgman polygon clipping, Weiler Amerton polygon clipping.

Module IV: 3-D Representation

8 lecture hours

Three Dimensional Concepts: Three Dimensional Display Methods. Three Dimensional Object Representations: Polygon surfaces, curved line and surfaces, spline representations, Bezier Curves & Surfaces, BSP line Curves and Surfaces, Constructive Solid- Geometry Methods, Octrees, BSP trees. Fractal geometry methods.

Module V: 3-D Transformation

8 lecture hours

Three Dimensional Geometric and, Modeling Transformations

Three Dimensional viewing: Projections

Visible Surface Detection Methods: back face detection method, depth buffer method Basic illumination methods: Phong & Gourand Shading, Texture Mapping.

Computer Animation: Design of Animation Sequences, General Computer Animation, Raster Animations, Computer-Animation Languages, Key-Frame Systems, Motion Specifications

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:

9. Enhance and practice employability skills required in the placement process using a simulated environment
10. Communicate effectively in a Personal Interview
11. Model interpersonal communication in a monitored environment
12. 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

7. Delivering Employability Skills in the Lifelong Learning Sector by Ann Gravells, ISBN-10: 1844452956
8. Sample Papers of Various companies
9. 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 Business Analysis Introduction to Data Mining	8 hours
Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.	
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 DataMining 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	MCA320			
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-3 Syntax 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	Computer Fundamentals			
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-2SEARCHING 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-3KNOWLEDGE REPRESENTATION	8 hours
First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – propositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution - Knowledge representation – Ontological Engineering - Categories and objects – Actions - Simulation and events - Mental events and mental objects	
Unit-4LEARNING	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-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	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, —Beginning 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

ELECTIVE-I

Basket-1

Sl No	Course Code	Name of the Electives					Assessment Pattern		
			L	T	P	C		MTE	ETE
1	MCA229	Open Source Programming with Python(Lab- MCA246)	3	0	1	4		50	50
2	MCA230	Programming in C# with Visual Studio .NET Framework	3	0	1	4		50	50
3	MCA231	Advance Programming in Java	3	0	1	4		50	50

Course Objectives

MCA229	Open Source Programming with Python	L	T	P	C
Version1.1	Date of Approval:	3	0	1	4
Pre-requisites//Exposure	Any Programming Language				
co-requisites					

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

Name of The Course	Programming in C# with Visual Studio .NET Framework			
Course Code	MCA230			
Prerequisite	C			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	1	4

Course Description:

This course will cover the practical aspects of multi-tier application development using the .NET framework. The goal of this course is to introduce the students to the basics of distributed application development. We will introduce the students to Web Service development and .NET remoting. Technologies covered include the Common Language Runtime (CLR), .NET framework classes, C#, ASP.NET, and ADO.NET. We will also cover service oriented architecture, design, performance, security, content managements systems and deployment issues encountered in building multi-tier distributed applications.

Course Outcomes

CO1	Understand basic concepts of Net framework
CO2	At the end of the course the student will be able to write efficiently the Net framework,
CO3	Able to access Libraries and develop the program for networking
CO4	Advanced Features Using C#
CO5	.Net Assemblies and Attribute

References

1. Wiley, "Beginning Visual C# 2008", Wrox
2. Fergal Grimes, "Microsoft .Net for Programmers". (SPI)
3. Balagurusamy, "Programming with C#", (TMH)
4. Mark Michaelis, "Essential C# 3.0: For .NET Framework 3.5, 2/e, Pearson Education
5. Shibi Parikkar, "C# with .Net Frame Work", Firewall Media.

Unit-1

The .Net framework: Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In-Time Compilation, Framework Base Classes.

Unit-II

C -Sharp Language (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces, Delegates and Events. Type conversion.

Unit-III

C# Using Libraries: Namespace- System, Input-Output, Multi-Threading, Networking and sockets, Managing Console I/O Operations, Windows Forms, Error Handling.

Unit-IV

Advanced Features Using C#: Web Services, Window Services, Asp.net Web Form Controls, ADO.Net. Distributed Application in C#, Unsafe Mode, Graphical Device interface with C#.

Unit-V

.Net Assemblies and Attribute: .Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute. Introduction about generic.

Continuous Assessment Pattern

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

Name of The Course	Advance Programming in Java			
Course Code	MCA231			
Prerequisite	None			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	1	4

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.	
Unit-4 Multithreading and Exception Handling	8 hours
Exception Handling: Exception as Objects, Exception hierarchy, Try, Catch, Finally, Throw. Multi threading: 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

ELECTIVE-II

Basket-2

Sl No	Course Code	Name of the Elective					Assessment Pattern		
			L	T	P	C		MTE	ETE
1	MCA361	Software Testing and Quality Assurance	3	0	0	3		50	50
2	MCA362	Advance DBMS	3	0	0	3		50	50
3	MCA363	Multimedia Systems	3	0	0	3		50	50

Name of The Course	Software Testing and Quality Assurance			
Course Code	MCA361			
Prerequisite	SE			
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The student should be able to:

- To understand software testing and quality assurance as a fundamental component of software life cycle
- To define the scope of SW T & QA projects
- To efficiently perform T & QA activities using modern software tools
- To estimate cost of a T & QA project and manage budgets
- To prepare test plans and schedules for a T&QA project
- To develop T & QA project staffing requirements
- To effectively manage a T & QA project

TEXT BOOKS:

- Effective Methods for Software Testing, Third edition, William E. Perry, Wiley India, 2009
- Software Testing – Principles and Practices, Naresh Chauhan, Oxford University Press, 2010.
- Software Quality Assurance – From Theory to Implementation, Daniel Galin, Pearson Education, 2009.

REFERENCE BOOKS:

1. Testing Computer Software, Cem Kaner, Jack Falk, Hung Quoc Nguyen, Wiley India, rp2012.
2. Software Testing – Principles, Techniques and Tools, M.G.Limaye, Tata McGraw-Hill, 2009.
3. Software Testing – A Craftsman’s approach, Paul C. Jorgensen, Third edition, Auerbach Publications, 2010.
4. Foundations of Software Testing, Aditya P. Mathur, Pearson Education, 2008.
5. Software Testing and Quality Assurance – Theory and Practice, Kshirasagar Naik, Priyadashi Tripathy, Wiley India, 2010.

UNIT – I : Software Quality Assurance and Standards:

The Software Quality challenge, What is Software Quality, Software Quality factors, The components of Software Quality Assurance system, Software Quality Metrics, Costs of Software Quality, Quality Management Standards, Management and its role in Software Quality Assurance, SQA unit and other actors in SQA system. – Quality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma and other latest quality standards.

UNIT – II : Software Testing Strategy and Environment:

Minimizing Risks, Writing a Policy for Software Testing, Economics of Testing, Testing-an organizational issue, Management Support for Software Testing, Building a Structured Approach to Software Testing, Developing a Test Strategy Building Software Testing Process: Software Testing Guidelines, workbench concept, Customizing the Software Testing Process, Process Preparation checklist –Software Testing Techniques: Dynamic Testing – Black Box testing techniques, White Box testing techniques, Static testing, Validation Activities, Regression testing -

UNIT – III : Software Testing Tools:

Selecting and Installing Software Testing tools – Automation and Testing Tools – Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, JMetra, JUNIT and Cactus.

UNIT – IV : Testing Process :

Seven Step Testing Process – I: Overview of the Software Testing Process, Organizing of Testing, Developing the Test Plan, Verification Testing, Validation Testing.

UNIT – V : Seven Step Testing Process – II:

Analyzing and Reporting Test results, Acceptance and Operational Testing, Post-Implementation Analysis
Specialized Testing Responsibilities: Software Development Methodologies, Testing Client/Server Systems

Continuous Assessment Pattern

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

Name of The Course	Advanced Database Management Systems			
Course Code	MCA362			
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. Raghuram 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

MCA363	<i>Multimedia Systems</i>	L	T	P	C
Version1.1	Date of Approval: XXXXXX, 2013	3	0	2	4
Pre-requisites//Exposure					
co-requisites					

Course Objectives

The subject is designed to meet the challenges in the latest technologies. It provides in-depth knowledge about the various latest computer technologies and enable the students to understand the role of information technology in various fields, the students know about input, output and communication devices and gain knowledge in database management systems, spreadsheets, word processing, Networking and Multimedia. It provides basic information about programming languages, methods and techniques.

Course Outcomes

The students shall be able to understand various latest information technologies in various fields, know the basics of networking, DBMS, multimedia and programming techniques.

Text Books

1. Multimedia Communications by RALF, CLARA, Pearson Education.

Reference Books

2. Multimedia Communications- Applications, Networks, Protocols & Standards by Fred Halsall., Pearson Education.
3. Multimedia Communications by RALF, CLARA, Pearson Education.

Course Content

Unit I: Multimedia Communications

X lecture hours

Introduction, multimedia information representation, multimedia networks, multimedia applications, application and networking terminology.

Multimedia information representation: Introduction, digitization principles, text, and images, audio, video.

Unit II: Text and image compression

X lecture hours

Introduction, compression principles, text compression, image compression. Various methods of text and image compression.

Unit III: Audio and video compression

X lecture hours

Text compression, image compression, various methods of audio compressions and video compressions.

Unit IV: Enterprise networks

X lecture hours

Introduction, LAN's, Ethernet/IEEE 802.3, token ring, bridges, FDDI, high speed LAN's, LAN protocols, multisites LAN interconnection technologies.

Mode of Evaluation: Quiz/Assignment/ Seminar/Written Examination.

Components	Theory		Laboratory		Theory and laboratory
	Internal	SEE	Internal	SEE	
Marks	50	50	50	50	
Total Marks	100		100		
Scaled Marks	75		25		100

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and POs		
Sl. No.	Course Outcomes (COs)	Mapped Program Outcomes
1	The students shall be able to understand various latest information technologies in various fields, know the basics of networking, DBMS, multimedia and programming techniques.	X
2		X
3		X
4		X

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
MCA311	Multimedia Systems	X		X	X					X			

1=addressed to small extent

2= addressed significantly

3=major part of course

Theory
 Lab