

GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD

(An Autonomous Institute of Government of Maharashtra)

Department of Master of Computer Application

Proposed Teaching and Evaluation Scheme

First Year M.C.A.

Effective from academic year 2013-14

SEMESTER-I

Course Code	Name of The Subject	Teaching Scheme			Total credits	Examination Scheme- Marks					
		L	T	P		Test	TA	ESE	Practical	Term Work	Total
Theory Courses											
MCA151	Discrete Mathematics	3	0	-	3	20	20	60	-	-	100
MCA152	Computer Programming	3	1	-	4	20	20	60	-	-	100
MCA153	Web Technology	4	0	-	4	20	20	60	-	-	100
MCA154	Data Structures	3	0	-	3	20	20	60	-	-	100
MCA155	Communication Skills	3	1	-	4	20	20	60	-	-	100
Laboratory Courses											
MCA156	Lab: Computer Programming	-	-	4	2	-	-	-	25	50	75
MCA157	Lab: Web Technology	-	-	4	2	-	-	-	25	50	75
MCA158	Lab: Data Structures	-	-	2	1	-	-	-	25	25	50
MCA159	Lab: Communication Skills	-	-	2	1	-	-	-	25	25	50
Total of Part-I		16	2	12	24	100	100	300	100	150	750

SEMESTER-II

Course Code	Name of The Subject	Teaching Scheme			Total credits	Examination Scheme- Marks					
		L	T	P		Test	TA	ESE	Practical	Term Work	Total
Theory Courses											
MCA160	Object Oriented Programming	3	1	-	4	20	20	60	-	-	100
MCA161	Computer Graphics	3	0	-	3	20	20	60	-	-	100
MCA162	Relational database Management Systems	4	0	-	4	20	20	60	-	-	100
MCA163	Software Engineering	3	1	-	4	20	20	60	-	-	100
MCA164	Numerical and Statistical Methods	3	0	-	3	20	20	60	-	-	100
Laboratory Courses											
MCA165	Lab: Object Oriented Programming	-	-	4	2	-	-	-	25	50	75
MCA166	Lab: Computer Graphics	-	-	2	1	-	-	-	25	25	50
MCA167	Lab: Relational database Management Systems	-	-	4	2	-	-	-	25	50	75
MCA168	Lab: Numerical and Statistical Methods	-	-	2	1	-	-	-	25	25	50
Total of Part-I		16	2	12	24	100	100	300	100	150	750

(L-Lectures, T-Tutorials, P-Practical, TA-Teacher Assessment, ESE-End-Semester Examination)

PART-I

Course Code : MCA151
Course Title : Discrete Mathematics

Teaching Scheme:

Lectures : 3 Hrs/Week
Total Credits : 3

Examination Scheme:

Test : 20 Marks
Assignment : 20 Marks
End Sem. Exam. : 60 Marks

Course Educational Objectives:

1) To make the students understand the basic concepts and master discrete mathematics in scientific computing.

Course Outcomes Expected:

1) To enable the students to apply the skill of discrete mathematics to solve real life problems

Contents:

Unit-1] Sets & Propositions: Combination of sets, finite & infinite sets, mathematical induction, Principle of inclusion & exclusion, propositions, multisets. [8-Hrs]

Unit-2] Permutation, Combinations & Discrete Probability: The rules of sum & product, permutation, combinations, generation of permutation & combinations, discrete probability, conditional probability. [8-Hrs]

Unit-3] Relation & functions: A relational model for databases, properties of binary relations, Equivalence relations & partitions, partial ordering relation & lattices chains & antichains, job scheduling problem, functions & pigeonhole principle. [8-Hrs]

Unit-4] Graphs: Basic terminology, multigraphs, weighted graph, paths& circuits, shortest path in weighted graph, Eulerian path & circuit, Hamiltonian path & circuits, traveling salesman problem, factors of a graph, planner graph. [8-Hrs]

Unit-5] Trees: Trees, rooted trees, path length in rooted trees, prefix codes, binary search tree, spanning tree & cutsets, minimum spanning tree, transport network. [8-Hrs]

Text Books:

- 1) Elements of Discrete Mathematics by C.L.Liu. McGraw Hill
- 2) Discrete Mathematical Structures with application to computer science by Trembly Manohar. McGraw-Hill

Course Code : MCA152
Course Title : Computer Programming

Teaching Scheme:

Lectures : 3 Hrs/Week
Tutorials : 1 Hrs/Week
Total Credits : 4

Examination Scheme:

Test : 20 Marks
Assignment : 20 Marks
End Sem. Exam: 60 Marks

Course Educational Objectives:

1. To understand the nature of programming as human activity
2. To familiarize the students with basic concepts of computer programming and developer tools.
3. To understand the principles of data storage and manipulation
4. Emphasis to be given on problem solving and algorithm implementation using C programming language.
5. To present the syntax and semantics of
 - a. Variables
 - b. Arithmetic and assignment operators
 - c. Control statements (if/else)
 - d. Looping constructs (while, for)
 - e. Methods
 - f. Arrays
 - g. Pointers
 - h. File input/output (I/O)
6. To get prepared for the more advanced programming courses

Course Outcomes Expected:

At the end of a course the student will understand the concepts of:

- 1) Variables, data Types (including strings and arrays) and Expressions
- 2) Flow of Control
- 3) Functional and procedural abstraction and its importance in good program design
- 4) Pointers and memory allocation (static and dynamic)
- 5) Iteration and Recursion

Contents:

Unit-1] Introduction - Programming language concepts, Algorithm flow chart, program, Machine language, Assembly language, High-level language. Fundamentals of C Language - Constants, Variables, Data Types, Operators, Expressions, IO statements. [8-Hrs]

Unit-2] Control Statements –IF, Simple IF, IF..ELSE, Nesting of IF..ELSE, ELSE IF ladder, Switch Statement, ternary operator, GOTO Statement. Looping statements - For, While, Do-While, Nesting of iterative statements [8-Hrs]

Unit-3] Arrays and Strings - Single and two dimensional arrays, Strings, Operation on strings (with and without library functions). [8-Hrs]

Unit-4] Functions – Library and user defined functions, Elements of user defined function, Categories of functions, nesting of functions, Recursion, passing array to function. Structures & Unions - Declaring a structure and accessing structure members, array of structures, Structures within structures, passing structure to function, bit fields, unions. [8-Hrs]

Unit-5] Pointers – Declaration of pointers, pointer expressions, pointers and arrays, pointers and character strings, pointers as function argument. File handling – File type, opening and closing of files, I/O operations on file, command line argument. Dynamic memory allocation- Allocating a block of memory, Allocation multiple block of memory, releasing the used space, altering the size of block. [8-Hrs]

Text books:

1. Programming in ANSI C by E/ Balagurusamy. MCGraw Hill companies.
2. Programming in C by Gottfried, Schaum Series, TMH
3. Let us C by Yashwant Kanitkar. BPB Publication
4. Programming in C by Avinash Pande. MIT Press

Reference books:

1. C: The Complete Reference by Herbert Schildt.McGraw Hill
2. Programming in ANSI C by Kerningham & D. Richie

Course Code : MCA153
Course Title : Web Technology

Teaching Scheme:

Lectures : 4 Hrs/Week
Total Credits : 4

Examination Scheme:

Test : 20 Marks
Assignment : 20 Marks
End Sem. Exam. : 60 Marks

Course Educational Objectives:

- 1) To give an introduction to basics of website because of the growing popularity of websites and web based application.
- 2) To make students familiar with the concepts of web designing.
- 3) To give students knowledge of advanced concepts of CSS helpful in creating professional Websites

Course Outcomes Expected:

- 1) After completion of these course students will be able to understand concepts of Web development, they will learn the new technologies associated with web.

Contents:

Unit-1] Introduction to Web, Introducing HTMLTags and Elements (Presentational, Basic Formatting, Lists, Links & Navigation, Images , Tables, Form Controls, Frame Element etc.), Properties of Tags & Events of the Elements. [8-Hrs]

Unit-2] Introduction to CSS – Adding CSS Rules, CSS Properties, CSS Selectors, Design Issues, Minimizing CSS, Inheritance in CSS, Reset in CSS, Browser Compatibility using CSS. [8-Hrs]

Unit-3] Learning JavaScript – Adding Scripts to your pages, Document Object Model, Starting Program with JavaScript, Functions, Operators, Conditional Statements, Looping. [8-Hrs]

Unit-4] Deployment – Introduction to domain and Hosting, Uploading website, Testing of website, Introduction to SEO, Using Analytics, AdWords and AdSense, Introduction to DHTML and XHTML. [8-Hrs]

Unit-5] Introduction to HTML 5, Introduction to CSS 3, Introduction to JQuery, Introduction to AJAX. [8-Hrs]

Text books:

1. Beginning HTML, XHTML, CSS, and JavaScript by Jon Duckett – Wrox Publication
2. Head First HTML with CSS & XHTML – O’Reilly Publication
3. HTML, CSS, JavaScript for Dummies
4. HTML & CSS: The Complete Reference, Fifth Edition By “Thomas Powell”

Course Code : MCA154

Course Title : Data Structures

Teaching Scheme:

Lectures : 3 Hrs/Week

Total Credits : 3

Examination Scheme:

Test : 20 Marks

Assignment : 20 Marks

End Sem. Exam. : 60 Marks

Course Educational Objectives:

- 1) To learn how data structure concepts are useful in problem solving.
- 2) To implement different ways of data structures such as stacks linked lists and trees.

Course Outcomes Expected:

- 1) Student will be able to appreciate the choices and tradeoffs which face a programmer in a real situation.

Contents:

Unit-1] Introduction to data structure: Arrays in C, Structures in C, Classes in C++, Primitive operations in stack, representing stacks in C, example- infix, postfix and prefix. [8-Hrs]

Unit-2] Queues and linked list: queues and its representation, priority queue, array implementation, operations in stack, array implementation of lists, linked lists using dynamic variables, examples of list operations in C, circular lists, header nodes, doubly linked list, examples. [8-Hrs]

Unit-3] Binary trees and graphs: operations in binary trees, applications of binary trees, trees and their applications, C representation, tree traversal, inorder, preorder, postorder, general expressions as trees, evaluating an expression tree, constructing a tree, height balanced trees, B trees, B+ trees, traversal methods, applications, efficiency, minimum spanning tree, Kruskal's algorithm. [8-Hrs]

Unit-4] Sorting and searching: efficiency of sorting, bubble sort, quick sort, heap sort, insertion sort, merge and radix sort, basic search techniques. [8-Hrs]

Unit-5] Storage management: Automatic list management: reference count method, garbage collection, variations of garbage collection, Dynamic memory management: compaction of blocks of storage, first fit, best fit, worst fit, freeing storage blocks, buddy tag method, buddy system. [8-Hrs]

Text books:

Aaron M. Tenenbaum, "Data Structures using C and C++"

Course Code : MCA155
Course Title : Communication Skills

Teaching Scheme:

Lectures : 3 Hrs/Week
Tutorials : 1 Hrs/Week
Total Credits : 4

Examination Scheme:

Test : 20 Marks
Assignment : 20 Marks
End Sem. Exam: 60 Marks

Course Educational Objectives:

- 1) To help Engineering students in acquiring adequate mastery of Communicative English
- 2) To provide language training to the students to enable them to understand and acquire knowledge in technical subjects.
- 3) To help students develop their personal and interpersonal skills to enable them to make their transition from college to workplace smoother and help them excel in their jobs
- 4) To develop vocabulary and technical writing of the student in professional discipline

Course Outcomes Expected:

- 1) Students will be able to improve their body language and soft skills.

Contents:

Unit-1] Communication Skills & Soft Skills: Basic Concept, Factors, Process and Types of Communication, Principles of Effective Communication, Barriers of Communication and how to overcome these barriers, Basic of Soft skills. [8-Hrs]

Unit-2] Nonverbal Communication And Corporate Etiquettes: Body Language and its different aspects, Voice Dynamics & Voice Modulation, Professional Appearance, Clothing Etiquettes and Corporate Dressing. [8-Hrs]

Unit-3] Remedial Grammar And Vocabulary Building: Parts of Speech, Types of Tense, Use of Articles, Synonyms and Antonyms, Find out the Grammatical Errors in the given sentences. [8-Hrs]

Unit-4] Writing Skills And Business Correspondence: Letter Writing, Office documents like Circulars, Notices, Minutes, Agenda And Memos, Report Writings, Resume Writing. [8-Hrs]

Unit-5] E-Communication: Email Communication And Email Etiquettes,

Text books:

1. Business Communication, Urmila Rai, S. M. Rai
2. Communication Skills , Leena Sen
3. William Sanborn, "Technical communication" Pearson publications.
4. "Presentation Skills for Managers", McGraw Hills brief case books.
5. Professional Communication Skill, Pravil S.R. Bhatia, S. Bhatia
6. Technical Report Writing Today: Daniel G. Riordan, Steven E. Pauley
7. Technical Writing: B. N. Basu
8. English Grammar Composition & Effective Business Communication, M. A. Pink, S. E. Thomas.
9. Written Communication in English, by Sarah Freeman.

Course Code : MCA156

Course Title : Lab: Computer Programming

Teaching Scheme:

Practical : 4 hrs/week

Total Credits : 2

Examination Scheme:

Practical Exam. : 25 Marks

Term Work : 50 Marks

Course Educational Objectives:

- 1) To understand the nature of programming as human activity
- 2) To familiarize the students with basic concepts of computer programming and developer tools.
- 3) To get prepared for the more advanced programming courses

Course Outcomes Expected:

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

- 1) Analyze a simple programming problem specification
- 2) Design a high-level (programming language independent) solution to the problem using functional abstraction and general imperative programming language constructs.
- 3) Write, compile, execute and debug a C program which maps the high-level design onto concrete C programming constructs.

Suggestive list of experiments:

1. A) Write a program to find area, perimeter of a rectangle by using formula:
area = p* q and perimeter= 2 * (p+q)
2. B) Write a program to convert a given temperature in Celsius to Fahrenheit by using formula: F=1.8 * Celsius + 32
3. Write a program to count the number of occurrences of positive numbers, negative numbers and zeroes in a stream of data terminated by a specific number.
4. Write a program to display Fibonacci series.
5. Write a program to find the sum of digits of a no.
6. Write a program to find square, cube, square root and cube root of a number using switch case statement
7. Write a program using function to generate a series of prime numbers up to n, when n being entered by user.
8. Write a program to find largest number from given n numbers using function.
9. Write a program to find factorial of a number using recursive function.
10. Write a program to pass a structure as an argument to a function.
11. Write a program which will read a string and rewrite it in alphabetical order. i.e. STRING will be printed as GINRST
12. Write a program using pointers to copy the contents of one string to another and display the contents of both strings.
13. Write a program to copy contents of one file onto another file using command line arguments
14. Write a program to create a library function.

Course Code : MCA157

Course Title : Lab: Web Technology

Teaching Scheme:

Practical : 4 Hrs/Week

Total Credits : 2

Examination Scheme:

Practical Exam. : 25 Marks

Term Work : 50 Marks

Course Educational Objectives:

- 1) To give Students a Hands-on Experience on HTML, CSS and Other Web technologies.
- 2) To give Students a Hands-on Experience on Advanced Web Concepts.

Course Outcomes Expected:

- 1) After completion of these suggestive experiments students will get hands-on experience on developing a web site.

Suggestive list of experiments:

1. Working with Basic Formatting & Presentational Tags.
2. Working with Form Elements like Button, Textbox etc.
3. Creating Tables, Frames and Layouts
4. Creating Inline, External style sheets
5. Working with Advanced CSS
6. Using JavaScript
7. Writing Functions, Operators and Control Structures with JavaScript
8. Using JQuery to add Animation Effects
9. Using HTML 5 and CSS 3 Properties
10. Mini Website

Course Code : MCA158
Course Title : Lab: Data Structures

Teaching Scheme:

Practical : 2 Hrs/Week
Total Credits : 1

Examination Scheme:

Practical Exam. : 25 Marks
Term Work : 25 Marks

Course Educational Objectives:

- 1) To learn to design the basic data structure algorithms.
- 2) To apply the concepts of data structure for solving simple mathematical problems
- 3) To enable to implement complex data structures like trees & graphs in High level language.
- 4) To implement searching & sorting methods.

Course Outcomes Expected:

- 1) Student can able to appreciate the choices and tradeoffs which face a programmer in a real situation.

Suggestive list of experiments:

1. Write a program for implementing Stack and Queue.
2. Write a program for Singly Linked List and Doubly Linked List.
3. Write a program for Circular Queue using Linked List.
4. Write a program for Creation of Binary Tree and operations on it.
5. Write a program for Creation of Binary Threaded Tree.
6. Write a program for Depth First search and Breadth First search.
7. Write a program for Bubble Sort and Bucket Sort.
8. Write a program for Merge Sort and Heap Sort.
9. Write a program for Insertion Sort and Quick sort.
10. Write a program for Binary Search to search an element in the given sequence.

Course Code : MCA159

Course Title : Lab: Communication Skills

Teaching Scheme:

Practical : 2 hrs/week

Total Credits : 1

Examination Scheme:

Practical Exam. : 25 Marks

Term Work : 25 Marks

Course Educational Objectives:

- 1) To help engineering students in acquiring adequate mastery of Communicative and Functional English
- 2) To provide language training to the students to enable them to understand and acquire knowledge in technical subjects.
- 3) To help students develop their personal and interpersonal skills to enable them to make their transition from college to workplace smoother and help them excel in their jobs
- 4) To develop vocabulary and technical writing of the student in professional discipline

Course Outcomes Expected:

- 1) Students will be able to write technical reports and letters
- 2) Students will be able to make presentations on technical & non-technical topics for the customers as per the company needs..

Suggestive list of experiments:

1. Different Communication Situation.
(Formal, Informal, Upward, Downward . etc)
2. Telephonic Communication.
(Enquiry, Leaving Message.etc)
3. JAM Sessions
4. Group Discussion.
5. Debate.
6. Presentation
7. Interview
8. Practical Based on the following Points:
 - a. Parts of Speech,
 - b. Types of Tense,
 - c. Use of Articles,
 - d. Synonyms and Antonyms,
 - e. Find out the Grammatical Errors in the given sentences.
9. Practical Based on the following Points
 - a. Letter Writing,
 - b. Office documents like, Notices, Minutes, Agenda
 - c. Report Writings.
 - d. Resume Writing
10. Email Writing,
11. Listen to the Audio and Answer the Questions
12. Analyze the Data and answer The questions

PART- II

Course Code : MCA160

Course Title : Object Oriented Programming & Systems

Teaching Scheme:

Lectures : 3 Hrs/Week

Tutorials : 1 Hrs/Week

Total Credits : 4

Examination Scheme:

Test : 20 Marks

Assignment : 20 Marks

End Sem. Exam: 60 Marks

Course Educational Objectives:

- 1) To make the students proficient in basic programming skills
- 2) Understand the fundamental Object Oriented Concepts
- 3) To get the basic understanding of object-oriented software design
- 4) To present the syntax and semantics of the “C++” language as well as basic data types offered by the language
- 5) To get prepared for the more advanced programming courses

Course Outcomes Expected:

- 1) Students will be aware of the basic Object Oriented Programming language concepts.
- 2) Students will be able to write the C++ code to achieve the OOPs concepts.

Contents:

Unit-1] Functions: Function prototyping, inline functions, default arguments, const arguments, function overloading, friend function. [8-Hrs]

Unit-2] Classes and Objects: Specifying a class, Defining members of the class, making outside function inline, Nesting of member functions, Arrays within class, Static members, Arrays of objects, Objects as function arguments, friendly functions, constructors and destructors. [8-Hrs]

Unit-3] Operator overloading and type conversion: Overloading unary and binary operators, overloading binary operators with friend function, manipulating strings using operators, rules for operator overloading, type conversion. [8-Hrs]

Unit-4] Inheritance: Single inheritance, multilevel inheritance, multiple inheritance, Hierarchical inheritance, hybrid inheritance, virtual base class, abstract class, constructors in derived classes, virtual functions, pure virtual functions. [8-Hrs]

Unit-5] File management: Managing console I/O operations, classes for file stream operations, opening and closing file, Sequential I/O operations, Random Access Templates- Class template, class template with multiple parameters, function template, function template with multiple parameters, overloading of template functions, member function template, non-type template arguments. [8-Hrs]

Text books:

1. Object oriented programming in C++ by E. Balgurusamy Tata McGraw Hill
2. The C++ Programming Language by Bjarne stroustrup(Addison – Wesley)
3. OOP with C++ by Robert Lafore (Galgotia)

Reference books:

1. C++ Primer by Ranade & Zamir(McGraw-Hill)
2. C++: The Complete Reference, 4th Ed. by Herbert Schildt

Course Code : MCA161

Course Title : Computer Graphics and Multimedia

Teaching Scheme:

Lectures : 3 Hrs/Week

Total Credits : 3

Examination Scheme:

Test : 20 Marks

Assignment : 20 Marks

End Sem. Exam. : 60 Marks

Course Educational Objectives:

- 1) To study the graphics techniques and algorithms.
- 2) To study the multimedia concepts and various I/O technologies.
- 3) To enable the students to develop their creativity

Course Outcomes Expected:

- 1) Students will be able to draw & manipulate graphical objects, create more interactive GUIs
- 2) Students will be able to create and manipulate 2D and 3D objects programmatically and achieve animation effects.

Contents:

Unit-1] Computer Graphics System: Overview of Computer Graphics, Computer Graphics Application and Software, Video display devices :- Color CRT Monitors, Raster scan & Random Scan Display Systems, DVST, Flat Panel Display :- LCD ,LED, Plasma display. 3D Viewing devices, Input & Output Devices. [8-Hrs]

Unit-2] Graphics Output Primitives: Scan Conversion, Rasterization, Line drawing algorithms, Circle drawing algorithms, Ellipse drawing algorithms, Character generation, Color Models & color application, Filled area algorithms, Aliasing & anti-aliasing. [8-Hrs]

Unit-3] Two Dimensional Transformations, Clipping and windowing: Basic transformations: Translation, Rotation, Scaling, Matrix representation and Homogeneous Coordinates, Composite transformations, Other Transformations: Reflection & Shear, Line Clipping algorithm, Viewing transformation, Polygon clipping algorithm, Interior/Exterior clipping, Text clipping. [8-Hrs]

Unit-4] Basic 3D concepts and Computer Animation: Different 3D display methods: Parallel projection, Perspective projection and Depth cueing, Basic 3D transformations, Spline representation, B-Spline curves & surfaces, Bezier curves & surfaces, Fractal geometry methods, classification of fractals, Design of animation sequences, animation functions, morphing, simulation, Virtual reality environments. [8-Hrs]

Unit-5] Multimedia: An Introduction , Multimedia applications , Multimedia System Architecture, Evolving technologies for Multimedia, Multimedia Databases, Compression & Decompression, Data & File Format standards, Multimedia I/O technologies, Digital voice and audio, Video image and animation, Compression through spatial & temporal redundancy, Multimedia authoring. [8-Hrs]

Text books:

- 1) Computer Graphics & Multimedia Techniques, A. P. Godse – Technical Publications, Pune
- 2) Prabat K Andleigh and Kiran Thakrar, “Multimedia Systems and Design”, PHI, 2003

Reference books:

- 1) Computer Graphics: Donald Hearn and M. Pauline Baker, PHI
- 2) <http://www.cs.rit.edu/~ncs/Courses/570.shtml>

Course Code : MCA162

Course Title : Relational database Management Systems

Teaching Scheme :

Lectures : 3 Hrs/Week

Total Credits : 4

Examination Scheme :

Test : 20 Marks

Assignment : 20 Marks

End Sem. Exam. : 60 Marks

Course Educational Objectives:

- 1) To have knowledge of RDBMS, both in terms of use and implementation/design.
- 2) To be familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B-tree, and hashing
- 3) To master the basics of query evaluation techniques and and query optimization.
- 4) To be familiar with the basic issues of transaction processing and concurrency control.

Course Outcomes Expected:

- 1) Students will be able to understand, use & design the relational databases.
- 2) Students will be able to access and manipulate the RDBMS.

Contents:

Unit-1] Basic concepts & File organization: Data modeling, Records, Files, abstraction and data integration, Three-level architecture, Components of DBMS, advantages and disadvantages, data models introduction, data associations, data models classifications, Relational data model, network data model, hierarchical model, Introduction to File organization, Serial files, sequential files, index-sequential files, direct files, secondary key retrieval, indexing using tree structures, logical and physical pointers, record placement. [8-Hrs]

Unit-2] Relational model & Relational database manipulation: Introduction, relational database Relational algebra, relational calculus, data manipulations, and physical implementation issues. . Relational database manipulation: introduction, SQL, Data manipulations, views, Embedded data manipulations, QBE [8-Hrs]

Unit-3] Relational database design & higher order normal forms: Relational schema, relational database, anomalies in database, universal design, functional dependency, relational database design. Synthetic approach and higher order normal forms: Problems in decomposition, normalization, multi-valued dependency, normalization using join dependency, domain key normal forms. [8-Hrs]

Unit-4] Query Processing: Introduction, general strategies for query processing, transformation into an equivalent expression, expected size of relations, statistics in estimation, query improvement, query evaluation, evaluations of calculus, view processing, typical query processor. [8-Hrs]

Unit-5] Recovery: Reliability, transactions, Recovery in centralized DBMS, reflecting updates to database and recovery. Buffer management, virtual memory and recovery, other logging schemes, cost comparison, disaster recovery. [8-Hrs]

Text book:

- 1) An introduction to database Systems By Bipin C. Dasai – Revised Edition- Galgotia Publications Ltd.

Reference books:

- 1) Database Management Systems Designing and building business applications by Post, Tata McGraw Hill Publications – 2nd Edition.
- 2) Database concepts by Korth - Tata McGraw Hill Publications -5th Edition
- 3) Database systems by Ramkrishna and Gherke - Tata McGraw Hill Publications 3rd edition.
- 4) An Introduction to DBMS by C.J. Date, Pearson Publication 7th Edition (LPE)

Course Code : MCA163
Course Title : Software Engineering

Teaching Scheme :

Lectures : 3 Hrs/Week
Tutorials : 1 Hrs/Week
Total Credits : 4

Examination Scheme :

Test : 20 Marks
Assignment : 20 Marks
End Sem. Exam: 60 Marks

Course Educational Objectives:

- 1) To make students aware of the complete software development process in the corporate world.
- 2) To make the students implement standard disciplinary processes for the software development that result in high quality product.
- 3) To increase students ability to convert the customer requirements in to a high quality product using standard models.

Course Outcomes Expected:

- 1) Students will be able to create the software projects in more disciplined and structured way to achieve quality software.
- 2) Students will be able to deal with the various tradeoffs involved in the engineering process of the software.

Contents:

Unit-1] History and overview: Indicate some important topic areas such as software process, requirements, specifications, design, testing, validation, evolution and project management, examples for software engineering approach, importance of language selection when doing software design, importance of testing and validation in software projects, explore some additional resources associated with software engineering, purpose and role of software engineering in computer engineering. [8-Hrs]

Unit-2] Software processes, requirements and specifications: Software life cycle and process models, Process assessment models, software process metrics for the development and maintenance of diverse software products, Requirements elicitation, Requirement analysis modeling techniques, functional and nonfunctional requirements, prototyping, Basic concepts of formal Specification techniques. [8-Hrs]

Unit-3] Software design: Fundamental design concepts and principles, software architecture, structured design, object-oriented analysis and design, component-level design, design for reuse. [8-Hrs]

Unit-4] Software testing and validation: Validation planning, testing fundamentals, including test plan creation and test case generation, black-box and white-box testing techniques, unit, integration, validation, and system testing. [8-Hrs]

Unit-5] Software evolution: Software maintenance: the different forms of maintenance, the associated disciplines and the role and the nature of the configuration management, characteristics of maintainable software, software reuse strengths and weaknesses, reengineering. [8-Hrs]

Text books :

1. “Software Engineering” – Roger S. Pressman, TMH
2. Shrinivasan, Gopaldaswamy, “Software Testing” – Pearson Education
3. William Perry, “Effective Methods for Software Testing”, John Wiley & Sons, New York, 1995.
4. Cem Kaner, Jack Falk, Nguyen Quoc, “Testing Computer Software”, Second Edition, Van Nostrand Reinhold, New York, 1993.
5. Boris Beizer, “Software Testing Techniques”, Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
6. Louise Tamres, “Software Testing”, Pearson Education Asia, 2002

Course Code : MCA164

Course Title : Numerical and Statistical Methods

Teaching Scheme:

Lectures : 3 Hrs/Week

Total Credits : 3

Examination Scheme:

Test : 20 Marks

Assignment : 20 Marks

End Sem. Exam. : 60 Marks

Course Educational Objectives:

1) To make the students to understand the basic concepts and master the Numerical and Statistical techniques in scientific computing .

Course Outcomes Expected:

1) To able the students to apply the skill of mathematical and statistical techniques to solve real life problem problems numerically and by Computer programming.

Contents:

UNIT-1] Algebraic and transcendental equations (7-Hrs)

General theorems(without proof) concerned with roots of an equations, Methods for finding the roots of an equation:Bisection Method, Newton-Raphson Method,Convergence criterion of the methods.

Unit-2] Simultaneous Linear Algebraic equations (7- Hrs)

Direct Methods: Guass ellimination Method, Guass Jordan Method,LU Decomposition Method.
Iterative methods: Jacobi Iterative method,Guass-Seidal Iterative Method ,Matrix inversion by LU decomposition method.

Unit-3] Finite differences and Interpolation (8- Hrs)

Difference operators,Forward ,Backward Difference, Shift operator and relation between them.Newton's forward and backward difference interpolation(without proof) , Lagrange's interpolation formula for unequally spaced arguments.(without proof).

Unit-4] Statistical methods (8- Hrs)

Curve fitting by method of least squares, Concept of Probability , Random variables , Expectation and variance, probability density function,Normal probality distribution with mean and variance, standard normal variate,properties of normal distribution (without proof)

Unit-5] Sampling and Hypothesis Testing (10- Hrs)

Types of sampling, Sampling distribution,Standard error
Concept of hypothesis, Statistical hypothesis,Null hypothesis,Alternative hypothesis, Level of significance, Test of significance for large samples, Test for difference of proportions, test for single mean and difference of standard deviation,Chi-square distribution ,Chi-square variate,Chi-square test of goodness of fit ,Chi-square test of independence of two attributes.

Text books:

1. Girish Nayyar ,Katson books
Numerical Methods (A programming Approach)
2. Dr. Debasis Dutta , Laxmi publications
Statistics and operation Reaserch
3. S.S.Sastry
Introductory Methods of Numerical Analysis
4. V.Rajaraman
Computer Oriented Numerical Methods
- 5 E.Balagurusamy
Numerical Methods
6. H.C.Saxena
Finite Difference and Numerical Analysis
7. H..C. Gupta
Fundamentals of Statistics
8. S. P Gupta
Statistical Methods
9. S.C Gupta, Gupta Indra
Business Statistics

10. A.K.Jaiswal,Anju Khandelwal

Computer based Numerical Methods and statistical Techniques

Reference Books:

1. M.K. Jain,S.R.K Iyengar, R.K.Jain, New age international
Numerical Methods for Scientific and Engineering Computation

Course Code : MCA165

Course Title : Lab: Object Oriented Programming & Systems

Teaching Scheme:

Practical : 4 hrs/week

Total Credits : 2

Examination Scheme:

Practical Exam. : 25 Marks

Term Work : 50 Marks

Course Educational Objectives:

- 1) To make the students proficient in basic programming skills.
- 2) To present the syntax and semantics of the “C++” language as well as basic data types offered by the language.
- 3) To get prepared for the more advanced programming courses.

Course Outcomes Expected:

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

- 1) Analyse a simple programming problem specification
- 2) Design a high-level (programming language independent) solution to the problem using functional abstraction and general imperative programming language constructs.
- 3) Write, compile, execute and debug a C++ program which maps the high-level design onto concrete C++ programming constructs

Suggestive list of experiments:

- 1 To calculate biggest of three numbers entered through constructor and then use destructor at end of program.
- 2 Write a program to find greatest of 3 numbers using friend function
- 3 Write a program to implement various types of constructors
- 4 Write a program to implement static members
- 5 Write a program to implement the concept of local class.
- 6 Write a program to overload binary + operator to add two times using friend function.
- 7 Create two classes, circle and rectangle with a member function showarea(). Write a program to find the difference between the area of circle and rectangle using friend class.
- 8 Write a program to convert class to basic type and class to class.
- 9 Write a program to enter the information of a student and then display it using the single inheritance concept (One base class – personal, and two derived classes – physical and academic)
- 10 Write a program to illustrate the hierarchical inheritance. Create the base class called book and it is derived into two new classes, Engineering Book and Novel.

- 11 Write a program to demonstrate the concept of polymorphism applied to the member functions.
- 12 Write a program to copy contents of one file into another file.

Course Code : MCA-166
Course Title : Lab: Computer Graphics

Teaching Scheme:

Practical : 2 hrs/week
Total Credits : 1

Examination Scheme:

Practical Exam. : 25 Marks
Term Work : 25 Marks

Course Educational Objectives:

- 1) To study the basic graphics techniques and algorithms.
- 2) To study the multimedia concepts and programming.
- 3) To enable the students to develop their programming creativity.

Course Outcomes Expected:

- 1) Students will be able to implement the various algorithms programmatically.
- 2) Students will be able to use their creativity & create dynamic GUIs and animation effects.

Suggestive list of experiments:

- 1] Write a program demonstrating basic graphics functions.
- 2] Write a program for DDA Line drawing Algorithm
- 3] Write a program for Line drawing Algorithm
- 4] Write a program for Circle drawing Algorithm
- 5] Write a program for Ellipse drawing algorithm
- 6] Write a program for Character generation.
- 7] Write a program for filled area algorithm.
- 8] Write a program for 2D transformations.
- 9] Write a program for Line clipping Algorithm
- 10] Write a program for Polygon clipping algorithm.
- 11] Program for demonstrating computer animation.
- 12] Programs for multimedia.

Course Code : MCA-167

Course Title : Lab: Relational database Management Systems

Teaching Scheme:

Practical : 4 hrs/week

Total Credits : 2

Examination Scheme:

Practical Exam. : 25 Marks

Term Work : 50 Marks

Course Educational Objectives:

- 1) To make students aware of the basic RDBMS concepts.
- 2) To make students create, populate, access and manipulate the RDBMS.

Course Outcomes Expected:

- 1) Students will be able to create, populate, access and manipulate the RDBMS.
- 2) Students will be able to write queries, generate expected outputs, optimize queries etc.

Suggestive list of experiments:

1. Introduction to SQL –Queries and sub queries.
2. Use of control structures.
3. To demonstrate the use of cursor for loop.
4. To demonstrate the use of predefined exceptions.
5. To demonstrate the use of use defined exceptions.
6. To demonstrate the use of implicit cursor.
7. To demonstrate the use of explicit cursor.
8. To demonstrate the use of reference cursor.
9. To demonstrate the use of functions in PL/SQL.
10. To demonstrate the use of procedure in PL/SQL.
11. To demonstrate the use of package in PL/SQL.
12. To demonstrate the use of trigger in PL/SQL.
13. To demonstrate the use of ODBC connection.

Course Code : MCA-168

Course Title : Lab: Numerical and Statistical Methods

Teaching Scheme:

Practical : 2 hrs/week

Total Credits : 1

Examination Scheme:

Practical Exam. : 25 Marks

Term Work : 25 Marks

Course Educational Objectives:

1) To be able to apply skills of Numerical and statistical techniques to solve the real life problems using computer programming.

Suggestive list of experiments:

1. Write a general program of Bisection Method and execute it for the problem given.
2. Write a general program of False position Method and execute for the problem given.
3. Write a general program of Newton-Raphson Method and execute for the problem given.
4. Write a general program for Gauss elimination method and execute it for a 3X3 system.
5. Write a general program for Gauss-Seidal method and execute it for a 3X3 system.
6. Write a general program for Gauss Jordan method and execute it for a 3X3 system.
7. Write a general program for Jaccobi's iteration method and execute it for a 3X3 system.
8. Write a general program for Gauss-Seidal method and execute it for a 3X3 system.
9. Write a general program for fitting a straight line by method of least squares and execute it for the problem given.
10. Write a general program for fitting polynomial by method of least squares and execute it for the problem given.
11. Write a general program for fitting a exponential curve by method of least squares and execute it for the problem given.
12. Write a general computer program to find Mean/ mode/median/standard deviation and execute it for the data given.
13. Write a general computer program to find standard Coefficient of corealtion for bivariate data without frequencies and execute it for the data given.

To find :

Mean, mode, median, standard deviation, coefficient of correlation, using Matlab