H.P. TECHNICAL UNIVERSITY
HAMIRPUR (HP)

Syllabus

[Effective from the Session: 2013-14]

Master of Computer Applications (MCA)

MCA COURSE STRUCTURE

FIRST YEAR

Semester – I

Course Code	Course Title	Periods			Marks		
		L	T	P	Theory	Internal Assessment	Total
MCA-101	Programming Methodologies (C & C++)	3	1	-	60	40	100
MCA-102	Fundamentals of IT and Digital Electronics	3	1	-	60	40	100
MCA-103	Fundamentals of Management	3	1	-	60	40	100
MCA-104	Mathematics	3	1	-	60	40	100
MCA-105	Effective Communication Skills	3	1	-	60	40	100
MCA-106	Programming Methodologies (C & C++) Lab	-	-	2	50(External)	50(Internal)	100
MCA-107	Fundamentals of IT Lab	-	-	2	50(External)	50(Internal)	100

Semester – II

Course Code	Course Title	Periods			Marks		
		L	T	P	Theory	Internal Assessment	Total
MCA-201	Data Structures (C++ & Java)	3	1	-	60	40	100
MCA-202	Object-Oriented and Visual Programming using Java	3	1	-	60	40	100
MCA-203	Discrete Mathematics	3	1	-	60	40	100
MCA-204	Computer Architecture	3	1	-	60	40	100
MCA-205	Computer Networks	3	1	-	60	40	100
MCA-206	Data Structures Lab	-	-	2	50(External)	50(Internal)	100
MCA-207	Object-Oriented and Visual Programming using Java Lab	-	-	2	50(External)	50(Internal)	100

SECOND YEAR

Semester III

Course Code	Course Title	Periods			Marks		
		L	T	P	Theory	Internal Assessment	Total
MCA-301	Data Base Management System	3	1	-	60	40	100
MCA-302	Web Technology-I	3	1	-	60	40	100
MCA-303	Operating Systems	3	1	-	60	40	100
MCA-304	Theory of Computation	3	1	-	60	40	100
MCA-305	Software Engineering	3	1	-	60	40	100
MCA-306	Data Base Management System Lab	-	-	2	50(External)	50(Internal)	100
MCA-307	Web Technology-I Lab	-	-	2	50(External)	50(Internal)	100

Semester IV

Course Code	Course Title	Periods			Marks		
		L	T	P	Theory	Internal Assessment	Total
MCA-401	Fundamentals of Computer Algorithms	3	1	-	60	40	100
MCA-402	Web Technology-II	3	1	-	60	40	100
MCA-403	Operational Research	3	1	-	60	40	100
MCA-404	Mobile Computing	3	1	-	60	40	100
	Elective-I	3	1	-	60	40	100
MCA-406	Computer Algorithms Lab	-	-	2	50(External)	50(Internal)	100
MCA-407	Web Technology-II Lab	-	-	2	50(External)	50(Internal)	100

THIRD YEAR

Semester V

Course Code	Course Title	Periods			Marks		
		L	T	P	Theory	Internal Assessment	Total
MCA-501	Computer Graphics	3	1	-	60	40	100
MCA-502	ASP.NET Using C#	3	1	-	60	40	100
MCA-503	Artificial Intelligence	3	1	-	60	40	100
MCA-504	Compiler Design	3	1	-	60	40	100
	Elective -II	3	1	-	60	40	100
MCA-506	Computer Graphics Lab	-	-	2	50(External)	50(Internal)	100
MCA-507	ASP.NET Using C# Lab	-	-	2	50(External)	50(Internal)	100

Semester – VI

In 3rd year (Sixth semester) the student has to develop one project, which will be evaluated by the external examiner from the panel approved by the University authority/evaluation branch, Himachal Pradesh Technical University, Hamirpur on the following basis.

System Development Project

Sr. No.	Course Title	Marks
1.	System design	100
2.	Log Book and Interim Report	100
3.	Seminars(2)	100
4.	Project Report (3 Copies)	200
5.	Viva-Voce	100
	Total	**600**

Course Code	**MCA-101**	**L-3, T-1, P-0**	
Name of the Course	Programming Methodologies (C & C++)		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time= 3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Programming Methodologies (C & C++)

Section-A

Programming Tools- Problem analysis, Program constructs (sequential, decision, loops), Algorithm, Flowchart, Pseudo code, Decision table, Modular programming, Top Down and Bottom up approaches, Concept of High Level Languages, Low Level Languages, Assembly Languages, Assembler, Compiler, Interpreter, Type of errors. Overview of C- General Structure of C Program, C compilers, Editing, Compiling & , Running of a C program Data types, Constants and Variables, Operators and expressions, Storage Classes, Different types of expressions and their Evaluation, Conditional Expression, Assignment statement, Enumerated data type, Redefining/ Creating data types, Library functions, Type casting.

Section-B

Input/Output- Unformatted and formatted I/O Functions (Character and strings I/O, *Scanf ( ), Printf ( )*) Control Statements- Decision making using *if, if-else, elseif* and *switch* statements, Looping using *for, while* and *do-while* statements, Transferring Program controlling *break* and *continue* statements, Programming examples to illustrate the use of these control statements. Functions- Defining a function, Local variables, *return* statement, invoking a Function, specifying and passing arguments to a function, Functions returning non Integer, External, static, and register variable, block structure, initialization and recursion.

Section-C

Array & strings- Introduction to arrays, Declaring arrays, Initializing, arrays, Processing arrays, Pointers to arrays, Passing arrays as arguments to functions, Introduction to strings, Pointers to strings, Passing strings and Arrays of strings as arguments to a function, Programming examples to illustrate the use of arrays and strings. Pointers- Definition, Need of pointers, declaring Pointers, Accessing Values via Pointers, Pointer arithmetic, Types of pointers, Linked list, Programming examples to illustrate the use of pointers.

Section-D

Structures- Declaring a structure type, Declaring Variables of structure type, Initializing Structures, Accessing Elements of structures, arrays of structures, nested structures, Pointers to structures Programming examples to illustrate the use of Structures. Data files- Definition of data files, different ways of file processing (standard I/O and system I/O), description of various library functions for file handling, updating files, Programming examples to illustrate the use of Data Files.

Text books:

1. Mullis Cooper, ―Spirit of C, Jacob Publications.
2. Yashwant Kanetkar, ―Let us C, BPB Publications.
3. Gotterfied B. ―Programming in C, Tata McGraw Hill Publications.

Reference Books:

1. Kerninghan B.W. & Ritchie D. M., ―The C Programming Language, PHI Publications.
2. Yashwant Kanetkar, ―Pointers in C, BPB Publications.
3. Complete reference to C- Tata Mcgraw Hill
4. Reema Thareja – programming in C. - Oxford university press.
5. Pradip Dey and Manas Ghosh- Programming in C- Oxford university press.

Course Code	**MCA-102**	**L-3, T-1, P-0**	
Name of the Course	Fundamentals of IT and Digital Electronics		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Fundamentals of IT and Digital Electronics

Section-A

Characteristics of Computers, Input/output Devices, Storage Units, CPU, Computer System**.** Primary and Secondary Storage Devices, Mass Storage Devices: USB thumb drive. Managing disk Partitions, Multimedia Application in Education, Entertainment, Marketing. Common multimedia file formats**,** Software types, High level languages, Free domain softwares, Microsoft Windows- An overview of different versions of Windows, File management through Windows, DOS Internal and External Commands. An overview of Linux, File handling in Linux, Installation of Virtualization tool (VirtualBox)**,**

Section-B

Number systems, conversion between various number systems, Error detection and correction codes, Logic gates, Boolean algebra, Demorgan‘s theorem. Minimization techniques, K-Map, Sum of Product, Product of Sum. Combinational and sequential circuits: Full Adder, Full Subtractor, FlipFlops, Integrated Circuits, Characteristics of digital logic families-TTL, ECL, CMOS. Digital components: Decoders, multiplexers, registers, shift resisters, binary counters.

Section-C

Word Processing: Word processing concepts: saving, closing, Opening an existing document, Selecting text, Editing text, Finding and replacing text, printing documents, Creating and Printing Merged Documents, Character and Paragraph Formatting, Page Design and Layout. Editing and Profiling Tools: Checking and correcting spellings. Handling Graphics, Creating Tables and Charts, Document Templates and Wizards.

Presentation Package: Creating and Saving Presentations, Creating the Look of Your Presentation, Working in Different Views, Working with Slides, Making Notes Pages and

Handouts, Drawing and Working with Objects, Adding Clip Art and other pictures, Designing Slide Shows, Running and Controlling a Slide Show, Printing Presentations.

Section-D

Spreadsheet Package: Spreadsheet Concepts, Creating, Saving and Editing a Workbook, Inserting, Deleting Work Sheets, entering data in a cell / formula Copying and Moving from selected cells, handling operators in Formulae, Functions: Mathematical, Logical, statistical, text, financial, Date and Time functions, Using Function Wizard. Formatting a Worksheet: Formatting Cells – changing data alignment, changing date, number, character or currency format, changing font, adding borders and colors, Printing worksheets, Charts and Graphs – Creating, Previewing, Modifying Charts. Integrating word processor, spread sheets, web pages.

Indian IT Act, Intellectual Property Rights – issues. Applications of information Technology (Railways, Airlines, Banking, Insurance, Inventory Control, Financial systems etc).

Text Books:

1. P.K. Sinha and P. Sinha, " Foundations of Computing" , BPB Publication.
2. Fundamentals of Computer, JB Dixit, Luxmi Publications.
3. Microsoft office Bible, , John Walkenbach Herb, Wiley India
4. Rajaraman V. & Radhakrishnan, ―An Introduction to Digital Computer Design‖, PHI.
5. 2. Morris M. M., ―Digital Logic and Computer Design‖, PHI

Reference Books:

1. ITL Educational Society, "Introduction to IT", Pearson Education, 2009.
2. Miller M, "Absolute Beginners Guide to Computer Basics", Pearson Education, 2009.
3. Turban, Mclean and Wetherbe, "Information Technology and Management" John Wiely & Sons**.**
4. Balagurusamy E, "Fundamentals of Computers", 2009, Tata McGraw-Hill
5. D'Suoza & D'souza, "Learn Computer Step by Step", Pearson Education, 2006.
6. Kulkarni, "IT Strategy for Business", Oxford University Press
7. "The Complete reference Unix" Second Ed, Tata McGraw Hills.
8. The Conceptual Guide to Openoffice.org,Gabrial Gurley R, Concise Concepts Inc

Course Code	**MCA-103**	**L-3, T-1, P-0**	
Name of the Course	Fundamentals of Management		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Fundamentals of Management

Section-A

Organizational structure: Forms of Organizations, Classical theory of organization: Functional approach, Division of labor, Lines of authority, Span of control, Authorities and responsibilities, Efficiency of management, MBO.

Section-B

Behavioral theory of Organization: Limitations of formal organization, Human relations, Group behavior, Committee and group decision making, Motivation and responsiveness to stimuli. Decision process approach: Parts of organization system, Development of corporate strategy, Dynamic of Decision, Roll of system. Types of models: Mathematical planning models, Deterministic and probabilistic models.

Section-C

Personnel management: Personnel function: Its evolution, Objectives, Principles, philosophies and policies, duties and responsibilities of the personnel manager, Position of personnel department in the organization, Line and staff relationship and the changing concept of personnel management in India, Challenges of personnel management. Manpower planning: Its uses and benefits, problems and limitations, manpower inventory, Manpower forecasting, Job descriptions, Manpower skills analysis and practice in the Indian industries.

Section-D

Recruitment: Job specification, Selection process, Psychological testing interviewing techniques, Transfer, Promotions and its policies, Induction placement and exit into view. Training and development: Its objectives and policies, Planning and organizing the training department, Training manager and his job, On and off the job training, Techniques, Carrier planning, Objective of Performance, appraisal and its methods, Wage and salary administration, workers participation in management.

Text Books:

1. LM Ogranizational Behavior, Sultan Chand and Sons, New Delhi.
2. Monappa Arun and Salyajain M.S, ―Personal Management, Tata Mc.Graw-Hill Publications.
3. Rudrabasavaraj M.N., ―Dynamic Personnel Administration, Himalaya Publishing House, Bombay.
4. Edwin B Flippo, Priciples of Personal Management.

Reference Books:

1. Torrington and Hall, ―Personnel Management: A New Approach, Prentice-Hall International Publications.
2. Hellrigel Don, Solum, John W. and Wooden Richard, W., ―Oraganisation Behaviour, Web Publishing Company, New York.
3. Mc Cocmio, E.U., ―Human Factor in Engineering in Design, McGraw-Hill Publications, New Delhi.
4. Koontz Harold & Weihrich Heinz-Essential of Management(Tata McGraw Hill,5th Edition 2008)
5. Robbins, Stephgen P, Ogranizational behavior Sultan Chand and Sons

Course Code	**MCA-104**	**L-3, T-1, P-0**	
Name of the Course	**Mathematics**		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Mathematics

Section-A

Mathematical Logic*:* Propositional Logic; First Order Logic.

Probability*:* Conditional Probability; Mean, Median, Mode and Standard Deviation; Random Variables; Distributions; Uniform, Normal, Exponential, Poisson, Binomial.

Set Theory & Algebra*:* Sets; Relations; Functions; Groups; Partial Orders; Lattice; Boolean Algebra.

Section-B

Complex Numbers: Complex Numbers, square root of complex number and cube root of unity, De-Moivre's Theorem, root of complex number.

Combinatorics*:* Permutations; Combinations; Counting; Summation; generating functions; recurrence relations; asymptotics.

Graph Theory*:* Connectivity; spanning trees; Cut vertices & edges; covering; matching; independent sets; Colouring; Planarity; Isomorphism.

Section-C

Linear Algebra*:* Algebra of matrices, determinants, systems of linear equations, Eigen values and Eigenvectors.

Calculus*:* Limit, Continuity & differentiability, Mean value Theorems, Theorems of integral calculus, evaluation of definite & improper integrals, Partial derivatives, Total derivatives, maxima & minima.

Section-D

Numerical Analysis: Numerical solutions of nonlinear algebraic equations by Secant, Bisection and Newton-Raphson Methods;

Numerical Integration: Trapezoidal, Newton Cote's 1/3 rule ,Simpson's 3/8 rule.

Linear Equation: direct Method for Solving System of Linear equations (Gauss Elimination), Iterative Methods(Jacobi, Gauss-seidal).

Text Books:

1. Schaum's Outline of Complex Variables, 2ed - Murray R Spiegel
2. **Statistics :** S.K.Gupta & Kapoor
3. **Numerical Method :** Jain & Iyenger

Reference Books:

1. Integral Calculus Das & Mukherjee U.N. Dhur & Sons Pvt. Ltd.
2. Advanced Engineering Maths, Erwin Kreyszig, Wiley publication.
3. **Set Theory & Algebra :** Vikash Rahi , Das & Gupta
4. **Graph Theory :** Kolman & Bussy

Course Code	**MCA-105**	**L-3, T-1, P-0**	
Name of the Course	Effective Communication Skills		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Effective Communication Skills

Section-A

Grammar: Use of punctuation marks, articles, prepositions, Idioms & phrases and their usage, Phonetics, Spoken English. Writing Skills: Guide lines for effective writing; writing styles for application, personal resume, business letter, memo, Technical Report: Style, arrangements, illustration, main section and appendices, conclusion, list references, table of contents, synopsis, revision.

Section-B

Reading Skills: Model of reading to learn-P.S.O.R.; Reading, Tactics and strategies; Reading purposes: kinds of purposes and associated comprehension; Reading for meaning; reading outcomes structure of meaning technique, Paraphrase, Summary writing. Listening Skills: Barriers to listening, Effective listening skills, Feedback Skills. Attending telephone calls, Note taking. Speaking and Discussion Skills: Components of an effective talk/presentation, Planning and organizing content for a talk/presentation, use of visual aids, effective speaking skills, discussion skills.

Section-C

Communication Process: Concept and Importance, Definitions & kinds of communication. System of Communication: Formal and Informal, Barrier to effective communication, Grapevine system of Communication. Principles of Business communication: Planning and conducting conversations, Interviews and discussion, preparation of oral statements, effective listening, Electronic communication.

Section-D

Written communication: Guides to effective writing, correspondence: including letters and job application, Memorandum, office orders, Reports: Types and preparation, Project Reports.

Non-Verbal Communication: Importance and Type, Cluster and congruency, Kinetics Vocal Cues. Modern Forms of Communication: Telegram, Telex, Fax, Tele-conferences, E-Mail.

Text Books :

1. Essentials of Business Communication, By Rajender Pal & J S Korlahalli, Sultan Chand and Sons.
2. Business Communication, By K K Sinha, Galgotia Publishing Company.
3. English Grammer, By Wren and Martin

Reference Books:

1. Collins Cobuild, ―English Grammar.
2. L. Gartside, ―Model Business Letters.
3. Robert L Shuster, ―Written communication in Business.
2. Ragmond & Pettit, ―Business Communication.
3. McGrawth, ―Basic Managerial Skills for all.
4. Technical Report Writing, ―British Association for Commercial and Industrial Education.
5. Chrisitie Wright, ―Handbook of practical communication skills.

Course Code	**MCA-106(Lab)**	**L-0, T-0, P-2**	
Name of Course	Programming Methodologies (C & C++) Lab		
Lectures to be delivered	52(P =52 For Each semester)		
Semester End Examination	MM: 50	Min. Pass Marks- 20	
Continuous Assessment	Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%		Max. Marks: 50

Suggested List of Practical Topics

- Different data Types
- Different Operators
- Input/Output Functions
- Decision making statement
- Looping Statements
- Functions
- Array and Strings
- Pointers
- Structures
- File handling

Course Code	**MCA-107(Lab)**	**L-0, T-0, P-2**	
Name of Course	Fundamentals of IT Lab		
Lectures to be delivered	52(P =52 For Each Semester)		
Semester End Examination	MM:50	Min. Pass Marks- 20	
Continuous Assessment	Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%		Max. Marks: 50

Suggested List of Practical Topics

- DOS Internal and External Commands
- Creating virtual machine (VirtualBox)
- Windows File Management
- Formatting and printing document (word processor)
- Table operations in Word processor.
- Mail merge and macro
- Creating presentation with different objects
- Creating a database in spread sheet
- Formula and functions in spreadsheet

Course Code	**MCA-201**	**L-3, T-1, P-0**	
Name of the Course	Data structure (C++ & JAVA)		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time = 3 hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Data structure (C++ & JAVA)

Section A

Basics of C++: Structure of a program: Variables. Data Types. Constants Operators, Basic Input/Output, Control Structure, Functions, Compound Data Types: Arrays, Pointers, Dynamic Memory.

Object Oriented Programming: Classes, Encapsulation, Abstraction, inheritance, Polymorphism.

Introduction to data structure: data structure Definition, types of data structures.

Arrays: Memory representation and various operations. Address calculation, sparse arrays.

Section B

Linked List: Linked List: Definition, type (linear, circular, doubly linked, inverted), representing linked lists in memory, advantages of using linked list over arrays, various operations on Linked list (traversal, insertion, deletion).

Stacks: Definition & concepts of stack structure, Implementation of stacks, Operation on stacks (push & pop), Application of stacks (converting arithmetic expression from infix notation to polish and their subsequent evaluation, quick sort technique to sort an array, recursion).

Queue: Definition & concept of queues, implementation of queue, operation on queues (insert & delete), Type of queues (circular queue, priority queue).

Section C

Trees Structures: Tree, Binary Trees, Tree Traversal Algorithms (Pre-Order, In-Order, Post-Order), Threaded Trees, Trees in various Sorting & Searching Algorithms & their Complexity (Heap Sort, Binary Search Trees).

Graphs: Description of graph structure, Implementing graphs in memory, Graph traversals (Depth First Searching, Breadth First Searching, and Shortest Paths Problems).

Section D

File organization: File Structure: Structure and Processing of Sequential, Indexed Sequential and Direct files, Hashing.

Algorithm complexity, time-space trade-off between algorithms, Asymptotic notations: Big-O, omega, theta.

Sorting & Searching: Selection sort, Bubble sort, Merge sort, Radix sort, Quick sort, Sequential search, Linear search and their complexity.

Text Books:

1. Hubbard John. R, "Schaum's outline of Data Structures with C++", Tata McGraw-Hill, 2007.
2. Langsam Y,.Augenstein M.J and Tanenbaum A. M, "Data Structures Using C and C++", Second Edition, Pearson Education, 2007.
3. Kruse R, Tonodo C.L. and Leung B, "Data Structures and Program Design in C",Pearson Education, 2007.

Reference Books:

1. Horowitz E, Sahni S and Mehta D, "Fundamentals of Data Structures in C++,"Galgotia Publiction, 2009.
2. Weiss M A, "Data Structures and Algorithm Analysis in C++", Pearson Education,2007.
3. Litvin G, "Programmking with C++ and Data Structures", Vikas Publishing House.

Course Code	**MCA-202**	**L-3, T-1, P-0**	
Name of the Course	Object Oriented & Visual Programming Using Java		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3 hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (Based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Object Oriented & Visual Programming Using Java

Section-A

Object Oriented Programming: Introduction to OOP's Paradigm, Characteristics of OOP's.

History and Basics of Java: Java's History and Creation, Java's Magic: Byte-code, Its Features, Architecture of Java Virtual Machine, Importance of Java for the Internet, JDK, Java Editors (notepad++, eclipse, netbeans, jbuilder, bluej) Java Program Structure and Java's Class Library, Java Data Types, Variables, and Operators, Operator Precedence. Scope of Variables, Control Structure

Array and String: Declaration and Definition, String Handling Using String Class and it functions and Wrapper classes.

Introduction Classes: Fundamental of Classes & Methods, Constructors, Creating Objects of a Class, Assigning Object Reference Variables, Variable **this**, Overloading Methods.

Section-B

Extending Classes and Inheritance: Fundamental of Inheritance, Using Existing Classes, Polymorphism, Multiple Levels of Inheritance, Super keyword, super-class constructor, Abstraction through Abstract Classes, Using Final Modifier.

Packages & Interfaces: Understanding Packages, Defining a Package, Packaging up Your Classes, Adding Classes from a Package to Your Program, Understanding CLASSPATH, Standard Packages, Access Protection in Packages, Concept of Interface, Multiple Inheritance through Interfaces.

Exception Handling: The concept of Exceptions, Types of Exceptions, Dealing with Exceptions, Exception Objects, Try and catch blocks, Try Defining Your Own Exceptions

Section-C

Multithreading Programming: Understanding Threads, The Java Thread Model and life cycle of thread, The Main Thread, Creating a Thread, Creating Multiple Threads, Thread Priorities, Synchronization, Inter-thread communication, Deadlocks.

Input/ Output in Java: I/O Basic, Byte and Character Structures, I/O Classes, Reading Console Input Writing Console Output, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File, Stream Benefits.

Creating Applets in Java: Applet Basics, Applet Architecture, Applet Life Cycle, Simple Applet Display Methods, Requesting Repainting, Using The Status Window, The HTML APPLET Tag Passing Parameters to Applets.

Section-D

Working with Windows Abstract Toolkit: AWT Classes, Window Fundamentals, Working with Frame, Creating a Frame Window in an Applet, Displaying Information Within a Window.

Working with Graphics, Controls and Text : Working with Graphics, Working with Color, Setting the Paint Mode, Working with Fonts, Managing Text Output Using Font Metrics, Exploring Text and **Controls:** Introduction, Adding and Removing Controls, Responding to Controls such that Label, Buttons, Checkboxes, Choice, Lists, Scroll Bar, Text Field, Text Area. **Graphics:** Working with AWT Controls, Layout Managers and Menus.

Text books:

1. Object Oriented Programming With Java, Balagurusami
2. The Complete Reference JAVA by Herbert Schildt, TMH Publication.
3. Beginning JAVA, Ivor Horton, WROX Public.

References Books:

1. JAVA 2 UNLEASHED, Tech Media Publications.
2. JAVA 2(1.3) API Documentations.

Course Code	**MCA-203**	**L-3, T-1, P-0**	
Name of the Course	Discrete Mathematics		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

NSTRUCTIONS:

1. For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Discrete Mathematics

Section-A

Mathematical Logic: Statements and Notation, Connectives: negation conjunction, disjunction, statement formulas & truth tables, logical capabilities of programming languages, conditional & bi-conditional, well-formed formulas, tautologies, equivalence of formulas, duality law, tautological implications, formulas with distinct truth tables, functionally complete set of connectives, other connectives, two state devices and statement logic; Normal forms: disjunctive normal forms, connective normal forms, principal disjunctive normal forms, principal conjunctive normal forms, ordering and uniqueness of normal forms, completely parenthesized infix notation and polish notation, Theory of inference for the statement calculus; Validity using truth tables, rules of inference, consistency of premises, automatic theorem proving; predicate calculus; predicates, statement function, variables and quantifiers, predicate formulas, free and bound variables, universe of discourse; Inference theory of the predicate calculus; Valid formulas and equivalence, some valid formulas over finite universe, special valid formulas involving quantifiers, theory of inference for the predicate calculus, formulas involving more than one quantifier.

Section-B

Relations and Functions: A relational model for databases, properties of binary relations, equivalence relations and lattices, chains and anti-chains Boolean Algebra: Lattices and algebraic systems, principle of quality, basic properties of algebraic systems defined by lattices, distributive and complimented lattices, Boolean lattices and Boolean algebra, Boolean function and Boolean expressions, switching circuits.

Section-C

Trees and Cut-Sets: Trees rooted trees; path lengths in rooted trees; prefix codes; binary search trees; spanning trees and cut-sets; Minimum spanning trees. Discrete Numeric Functions and Generating Functions: Manipulation of numeric functions, asymptotic behavior of numeric functions, generating functions, combinatorial problems. Graphs and

Planar Graphs: Basic terminology; Multi-graphs and weighted graphs; Paths and circuits; Eulerian paths and circuits; Hamiltonian paths and circuits.

Section-D

Recurrence relations and Recursive algorithms: Recurrence relations, linear recurrence relation with constant coefficients, homogeneous solutions, particular solutions, total solutions, solution by method of generating functions, sorting algorithms Groups and Rings: Groups, sub-groups, generators and evaluation of powers, co-sets and Lagranges' theorem, permutation groups and Burnsides' theorem, codes and group codes, isomorphism and automorphism, homomorphism and normal sub-groups, rings, internal domains, fields, definitions and examples of groups, rings and fields.

Text & Reference Books:

1. Tremblay J.P. & Manohar R, ―Discrete Mathematical Structure with Applications to Computer Science (Topics: Mathematical Logic)
2. Liu C.L., ―Elements of Discrete Mathematics (Topics: Graphs and Plainer graphs, Trees & Cut sets, Discrete Numeric functions and generating functions, Recurrence relations and Recursive algorithms, Groups and Rings, Boolean algebra)

Course Code	**MCA-204**	**L-3, T-1, P-0**	
Name of the Course	Computer Architecture		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Computer Architecture

Section-A

Digital components: integrated circuits, decoders, multiplexers, registers, shift resisters, binary counters, memory unit.
Register transfers & micro-operations: Register Transfer Language, Register transfer, Bus & memory transfers, Arithmetic loops, Logic loops, Shift loops, Arithmetic, logic, shift unit.
Basic computer organization & design: Instruction codes, Computer registers, Computer Instructions, Timing & Control, Instruction cycle, memory reference instruction, I-O interrupt, Design of basic computer, Design of accumulator logic.

Section-B

Programming the basic computer: Machine language, Assembly language, Assembler, program loops, programming arithmetic and logic operations, subroutines, input-output programming. Micro-programmed Control: Control Memory, Address sequencing, Design of control unit. Central Processing Unit: General Register Organization, Stack organization, Instruction formats (zero, one, two, three), Address Instructions, Addressing Modes (direct, indirect, Immediate, relative, indexed), Data transfer & manipulation, Program control, RISC.

Section-C

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors. Computer Arithmetic: Addition & Subtraction, Multiplication algorithms, Division Algorithms, Floating point arithmetic operations, Decimal Arithmetic unit, Decimal Arithmetic operations.

Section-D

IO Organization: Peripheral devices, I/O interfaces, asynchronous data transfer, Modes of Data transfer, Priority Interrupts, DMA, I-O processors, Serial Communication. Memory Organization: Memory Hierarchy, Main Memory, Associative Memory, Cache Memory, Virtual Memory, Memory management hardware.

Multiprocessors: Characteristics, Interconnection structures: Time Shared, Common bus, Multi-port, Crossbar switch, Multistage, Inter-processor arbitration, Inter-processor communication & synchronization, cache coherence.

Parallel Computing: Parallel Virtual Machine and message passing interface, Libraries, and calls. Advanced architectures today's Fastest Computer.

Text Books:

1. Morris M. Mano, ―Computer System & Architecture, PHI Publications.
2. Stallings & Williams, ―Computer Organization & Architecture, Maxwell Macmillan.

Reference Books

1. V.Rajaraman & Radhakrishnan, ―Introduction to Digital Computer Design, PHI Publications.
2. P.Pal Chowdhary, ―Computer Organization & Design, PHI Publications

Course Code	**MCA-205**	**L-3, T-1, P-0**	
Name of the Course	Computer Networks		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Computer Networks

Section -A

Data Communication, Network Components. The OSI Reference Model: Layered architecture, Functions of layers, TCP/IP reference model, Comparison of OSI & TCP/IP models. Internet, frame relay, ATM, Ethernet, Wireless LAN.

Attacks on Computers & Computer security-- Need for security, approaches, principles, types of attacks, Cryptography concept and techniques, Symmetric Key algorithms-- (DES), Asymmetric key algorithms-- RSA, Digital signature , Firewalls. Internet radio, VoIP, E-mail security, Web security, social issues in network security.

Section -B

Physical layer: Theoretical basis for data communications-Fourier analysis, bandwidth limited signals, maximum data rate of a channel, Public switched telephone networks, mobile telephone system.

Data Link and Mac Layer: Design issues, Framing techniques, Flow control, Error Control, Data link Control and Protocols: For noiseless Channel – Simplest Protocol, Stop-and-Wait Protocol, For Noisy Channel-- Stop-and-Wait ARQ, Go-Back-N ARQ, and Selective-Repeat ARQ Protocol, HDLC Protocol, and PPP Protocol, Multiple Access-- Random Access-- MA, CSMA, CSMA/CD, CSMA/CA, Controlled Access—Reservation, Polling, Token passing, Channelization-- FDMA, TDMA, CDMA, and IEEE standards-- 802.3 (Ethernet), 802.4 (Token Bus), 802.5 (Token Ring), 802.11(Wireless LAN), 802.15 (Bluetooth).

Section -C

Network and transport Layer: Network layer design issues, Routing algorithms-shortest path routing, flooding, distance vector routing, link state routing, hierarchical routing, broadcast routing, multicast routing, routing for mobile hosts, Congestion Control algorithms – congestion prevention policies, congestion control in virtual circuit & datagram sub-networks, definition of quality of service, Internetworking – Tunneling, internet-work routing, fragmentation, Network layer in Internet –IP protocol, IP Address, OSPF, BGP, Internet multicasting, Mobile IP, Ipv6.

Transport Layer: Concept of transport service, elements of transport protocols, A simple transport protocol, Remote procedure call, Performance issues in computer networks.

Section -D

Application layer services protocols :DNS, SMTP, FTP, TELNET, HTTP,WWW.

Network Configuration & Socket Programming:Configuration of networking in Linux using ifconfig, route, bind, etc; configuration of firewall and masqueraing in Linux; network trouble-shooting and performance monitoring using netstat, ping, tcpdump, etc.Configuration and performance measurement of commonly-used Linux servers such as E-Mail (sendmail, pop3/imap) and Web (Apache).

Socket programming - TCP and UDP, peer-to-peer applications; reliable communications using unreliable datagrams; client-server using RPC; concurrent servers using threads or processes.

Text books:

1. B.A. Forouzan, ―Data Communication & Networking, 4th Edition Tata Mcgraw Hill.
2. A.S. Tanenbaum, ―Computer Networks, Prentice Hall, 1992, 4th edition.

References Books:

1. William Stallings, ―Data & Computer Communication, McMillan Publishing Co.
2. Black, ―Data Networks, PHI, 1988.
3. Fred Halsall, ―Data Communications, Computer Networks, Pearson Education

Course Code	**MCA-206(Lab)**	**L-0, T-0, P-2**
Name of Course	Data structure (C++ & JAVA) Lab	
Lectures to be delivered	52(P =52 For Each Semester)	
Semester End Examination	MM:50	Min. Pass Marks- 20
Continuous Assessment	Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%	Max. Marks: 50

Suggested List of Practical Topics

- Control Structure
- Functions
- Arrays
- Object Oriented Programming Concepts
- Link Lists(linear, circular, doubly linked, inverted)
- Queues (Simple, Circular Queue, Priority Queue)
- Different Trees, Binary Search Trees
- Heap Sort
- Graph Implementation, Graph traversals
- Different File Organization
- Sorting & Searching

Course Code	**MCA-207(Lab)**	**L-0, T-0, P-2**	
Name of Course	Object Oriented & Visual Programming Using Java		
Lectures to be delivered	52(P =52 For Each Semester)		
Semester End Examination	MM: 50	Min. Pass Marks- 20	
Continuous Assessment	Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%		Max. Marks: 50

Suggested List of Practical Topics

- Java Basics, Control Structure
- Arrays and Strings
- Fundamentals Of Classes
- Extending Classes and Inheritance
- Packages & Interfaces
- Exception Handling
- Multithreading Programming
- Input/ Output in Java
- Applets in Java
- Working with Windows Abstract Toolkit
- Working with Graphics, Controls and Text

Course Code	**MCA-301**	**L-3, T-1, P-0**	
Name of the Course	Data Base Management System		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Database Management System

Section-A

Basic Concepts, Records and Files, Abstraction and Data Integration, The Three-Level Architecture Proposal for DBMS, Components of a DBMS, Advantages and Disadvantages of a DBMS.

Data Associations, Data Models Classification: Relational Data Model, Network Data Model, Hierarchical Model. Manipulation, Updates, Implementation of data models, ER Diagrams

File Organization, Serial Files, Sequential Files, Index-Sequential Files, Direct File, Secondary Key Retrieval, Indexing Using Tree Structures.

Section-B

The Relational Model, Relational Database, Relational Algebra, Relational Calculus. Relational Database Design, Relational Scheme and Relational Design, Anomalies in a Database: A Consequence of Bad Design, Universal Relation, Functional Dependency, Relational Database Design.

Relational Database Manipulation, SQL, Data Manipulation, Basic Data Retrieval, Condition Specification, Arithmetic and Aggregate Operators, SQL Join: Multiple Tables Queries, Set Manipulation, Categorization, Updates, Views.

SQL Programming: Procedures, Cursors, Triggers.

Section-C

Concurrency Management, Serializability, Concurrency Control, Locking Scheme, Timestamp-Based Order, Optimistic Scheduling, Multiversion Techniques, Deadlock and Its Resolution. Database Security, Integrity, and Control, Security and Integrity, Threats, Defense Mechanisms, Integrity.

Section-D

Introduction to DDBMS, Fundamentals of DDBMS (Transparent management of distributed & replicated data, Reliability, Improved performance, System expansion), Types of DDBMS. Overview of three-tier Client server architecture. Data Fragmentation, Replication and allocation techniques for distributed database design. Query processing, concurrency control and recovery in DDBMS.

Text Books:

1. Desai, B., ―An Introduction To Database Concepts, Galgotia Publications, New Delhi.
2. Elimsari And Navathe, ―Fundamentals of Database Systems, Addison Wesley, New York.

Reference Books:

1. Date C.J., ―An Introduction to Database Systems, Narosa Publishing House, New Delhi.
2. Ullman, J.D, ―Principals of Database Systems, Galgotia Publications, New Delhi.
3. M. Tamer Ozsu & Patrick Valduriez, ―Principles of Distributed Database Systems‖, Pearson Education Asia.

Course Code	**MCA-302**	**L-3, T-1, P-0**	
Name of the Course	Web Technology-I		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Web Technology-I

Section-A

Introduction to Internet, Client-Server Technology, World Wide Web, Web-servers, Web Browsers, Multipurpose internet mail extension, hypertext transfer protocol.

HTML: Document Structure, html elements, tags and attributes, Basic elements (html, head, title body, p, heading) Basic text formatting, List (ordered and unordered), Hyper linking; handling images, audio and videos; table elements; Form elements. Introduction to HTML5, What's new in HTML5

Section-B

Styling Pages: Introduction to CSS; types of CSS (CSS-1, CSS-2, CSS-3), applying CSS (inline, embedded, external). CSS Properties: Text properties, font-properties, border properties. Selectors, universal, element selector, class selector, ID Selector, decedent selector, pseudo selector. Box Model: border properties, padding properties, margin properties. List properties, background properties, table properties.

Section-C

Javascript: basic functions (alert, confirm, prompt), adding javascript in page body. Document object model (DOM), Defining and calling functions: variables, operators, control structures. JavaScript Events, Predefined objects (String, date, math, array, window).

Validating form using JavaScript; Enhancing form with javascript: Focusing on form element, Autotabbing between fields, disabling text input, Case Conversion.

Javascript Libraries: Introduction, jquery, creating sliders using jquery.

Section-D

XML Document Structure, parsers and well formed XML Documents, Defining DTD, XML Namespaces, XML Schema: Schema v/s DTD, Simple API fpr XML (SAX), eXtensible Style sheet Language Transformation (XSLT)

Custom Markup Language: Introduction, Mathematical Markup Language (MathML), Chemical Markup Language (CML), Wireless Markup Language (WML), Geography Markup Language (GML), Scalable Vector Graphics (SVG), Bean Markup Language (BML), Extensible 3D Language (X3D).

Text Books:

1. Programming with world wide web by Robert Sebesta on Pearson
2. Beginning with HTML, XHTML, CSS and Javascript by John Duckett, Wiley-Wrox

References Books:

1. XML How to Program by Deitel and Deitel, Pearson
2. Javascript Bible, Wiley India.

Course Code	**MCA-303**	**L-3, T-1, P-0**	
Name of the Course	Operating System		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Operating System

Section-A

Introduction: Definition Of The Operating System, Functions Of An Operating System, Different Types Of Systems - Simple Batch System, Multi-Programmed Batched System, Time Sharing System, Personal Computer Systems, Parallel Systems, Distributed Systems, Real Time Systems, Computer System Structure- operation, I/O structure, storage structure, hardware protection, Operating System Services.

Section-B

Process Management: Process- Process Concept, Process Scheduling, Operation On Processes, Cooperating Processes, Threads, Inter-Process Communication, CPU Scheduling– scheduling criteria, scheduling algorithms – FCFS, SJF, priority scheduling, round robin scheduling, multilevel queue scheduling, multilevel feedback queue scheduling, multiple processor scheduling, real time scheduling.

Process Synchronization: The Critical Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions.

Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Section-C

Memory Management: Logical & physical address space, Swapping, Continuous Allocation (single partition, multiple partition), internal , external fragmentation, Paging, Segmentation, Segmentation With Paging, Virtual Memory, Demand Paging, Performance Of Demand Paging, Page Replacement, Page Replacement Algorithms– FIFO, optimal, LRU, LRU approximation algorithms, counting algorithms Thrashing, Demand Segmentation. File

System Interface: File Concept, Access Methods–sequential, direct, index, Directory Structure–single-level, two–level, tree-structured, acyclic-graph, general graph.

Section-D

File System Implementation: File System Structure, Allocation Methods-contiguous allocation, linked allocation, indexed allocation, Free Space Management-bit vector, linked list, grouping, counting, Directory Implementation–linear list, hash table, Efficiency And Performance, Recovery – consistency checking, backup and restore. Secondary Storage Structure: Disk Structure, Disk Scheduling, FCFS, SSTF, SCAN, C-SCAN, Look Scheduling, Selection of A Scheduling Algorithm, Disk Management-disk formatting, boot block, bad blocks.

UNIX: - Operating System, Structure of UNIX Operating System, UNIX Commands, Interfacing with UNIX, Editors & Compilers for UNIX.

Text Book:

1. Silberschatz, Galvin, ―Operating System Concepts, Addison Wesley Publishing Company.

Reference Books:

1. William Stallings, ―Operating Systems, Macmillan Publishing Company.
2. Deitel H.M., ―An Introduction To Operating System, Addison Wesley Publishing Company, 1984.
3. Tanenbaum, A.S., ―Modern Operating System, Prentice Hall of India Pvt. Ltd. 1995.
4. Kenneth Rosen,Douglas Host, The Complelete Reference, Unix, Tata McGraw Hill

Course Code	MCA-304	L-3, T-1, P-0	
Name of the Course	Theory of Computation		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Theory of Computation

Section-A

Introduction to theory of computation, Finite state automata – description of finite automata, Properties of transition functions, Designing finite automata, NFA, 2 way finite automata, equivalence of NFA and DFA, Mealy and Moor machine.

Section-B

Finite automata with epsilon moves, Minimization of FSA. Regular sets and regular grammars, regular expressions, pumping lemma for regular languages, closure properties of regular sets and regular grammars, Application of finite automata, Decision algorithms for regular sets, Chomsky classification of languages

Section-C

CFGs, Derivation trees, ambiguity, simplification of CFLs, normal forms of CFGs, pumping lemma for CFGs, decision algorithms for CFGs, designing CFGs, PDA – formal definition, examples of PDA, equivalence with CFGs, PDA and CFG, Chomsky hierarchy.

Section-D

Turing machines basics and formal definition, Language acceptability by TM, examples of TM, variants of TMs – multitape TM, NDTM, Universal Turing Machine, offline TMs, Equivalence of single tape and multitape TMs, recursive and recursively enumerable languages, decidable and undecidable problems – examples, halting problem, reducibility.

Text Books:

1. Hopcroft and Ullman., Introduction to Automata Theory, Languages and Computation. 2nd ed., Pearson EducationNarosa,

References Books:

1. Manna, Mathematical theory of computation –McGraw Hill
2. Peter Linz., Introduction to Formal Languages and Automata Theory, Narosa Publishing., 1997.
3. Zvi Kohai., Switching and Finite Automata Theory ,Tata McGraw Hill

Course Code	MCA-305	L-3, T-1, P-0	
Name of the Course	Software Engineering		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time= 3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Software Engineering

Section-A

Evolving Role of Software, Software Engineering, Changing nature of Software, Software Myths, Terminologies, Role of management in software development Software Process and desired Characteristics, Software Life Cycle Models: Build & Fix Model, Water Fall Model, Incremental Process Model, Evolutionary Process Models, Unified Process, Comparison of Models, Other Software Processes, Selection of a Model Software Requirements Analysis & Specifications: Requirements Engineering, Types of Requirements, Feasibility Studies, Requirements Elicitation, Requirements - Analysis Documentation, Validation and Management.

Section-B

Software Architecture: Its Role, Views, Component & Connector View and its architecture style, Architecture Vs Design, Deployment View & Performance Analysis, Documentation, Evaluation Software Project Planning: Size estimation, Cost Estimation, COCOMO, COCOMO – II, Software Risk Management

Section-C

Function Oriented Design: Design principles, Module level Concepts, Notation & Specification, Structured Design Methodology, Verification Object-Oriented Design: OO Analysis & Design, OO Concepts, Design Concepts, UML – Class Diagram, Sequence & Collaboration Diagram, Other diagrams & Capabilities, Design Methodology – Dynamic and Functional Modeling, Internal Classes & Operations Detailed Design: PDL, Logic/Algorithm Design, State Modeling of Classes, Verification – Design Walkthroughs, Critical Design Review, Consistency Checkers

Section-D

Coding: Programming Principles & Guidelines, Coding Process, Refactoring, Verification Software Metrics: What & Why, Token Count, Data Structure Metrics, Information Flow Metrics, Object-Oriented Metrics, Use Case Oriented Metrics, Web Engineering Project Metrics, Metric Analysis Software Maintenance & Certification: Maintenance, Maintenance Process and Models, Estimation of Maintenance Costs, Regression Testing, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation, Requirements of Certification, Types

Text Books:

1. Pankaj Jalote, ―An Integrated Approach to Software Engineering, 3rd Edition, Narosa Publishing House.
2. K.K. Aggrawal and Yogesh Singh, ―Software Engineering, 3rd Edition, New Age International (P) Ltd.

Reference Books:

1. Pressman, R.S., ―Software Engineering – A Practitioner's Approach, Third Edition, McGraw Hills.
2. Mall Rajib, ―Fundamentals of Software Engineering, PHI, New Delhi.

Course Code	**MCA-306(Lab)**	**L-0, T-0, P-2**
Name of Course	Database Management System Lab	
Lectures to be delivered	52(P =52 For Each semester)	
Semester End Examination	MM:50	Min. Pass Marks- 20
Continuous Assessment	Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%	Max. Marks: 50

Suggested List of Practical Topics

- Data Definition Language
  - Create, Alter, Drop
- Data Manipulation Language
  - Insert, Select, Delete, Update
- Clauses
  - Where, Having, Order By, Group By, Exists, In , Notin, Any
- Arithmetic and Aggregate Operators
- Set Manipulation operations
- Joins
  - Natural, Inner, Outer
- Sub queries
- Data Control Language
- Transaction Control Language

Course Code	**MCA-307(Lab)**	**L-0, T-0, P-2**
Name of Course	Web Technology-I Lab	
Lectures to be delivered	52(P =52 For Each semester)	
Semester End Examination	MM:50	Min. Pass Marks- 20
Continuous Assessment	Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%	Max. Marks: 50

Suggested List of Practical Topics

- HTML
    - Basic Elements
    - Text Formatting
    - Objects Handling
- HTML5
- CSS Basics
- CSS Properties
- Selectors
- Java Scripting
- Document object model (DOM)
- JavaScript Events
- Introduction, jquery
- XML Document Structure
- eXtensible Style sheet Language Transformation (XSLT)
- MathML, WML, GML, SVG, BML, X3D

Course Code	**MCA-401**	**L-3, T-1, P-0**	
Name of the Course	Fundamentals of Computer Algorithms		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3 hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Fundamentals of Computer Algorithms

Section-A

Introduction: Definition, How to Analyze Algorithms, Elementary Data Structures-Stacks and Queues, Trees, Heaps and Heap Sort, Sets and Disjoint Set Union Graphs, Hashing.

Section-B

Divide and Conquer: The General Method, Merge Sort, Quick Sort, Finding the Maximum and Minimum, Selection sort. The Greedy Method: The General Method Knapsack Problem, Job Sequencing With Deadlines, Minimum Spanning Trees, Single Source Shortest Paths.

Section-C

Dynamic Programming: The General Method Multistage Graphs, All Pairs Shortest Paths, Optimal Binary Search Trees, 0/1 Knapsack, Reliability Design, Traveling Salesperson Problem, Flow Shop Scheduling. Basic Search and Traversal Techniques: The Techniques Code Optimization and/or Graphs, Game Trees, Bi-Connected Components And Depth First Search.

Section-D

Back Tracking: The General Method, The 8 Queens Problem, Sum Of Subsets, Graph Coloring, Hamiltonian Cycles. NP Hard And NP Complete Problems- Basic Concepts , Cooks Theorem NP Hard Graph Problems , NP Hard Scheduling Problems , NP Hard Code Generation Problems.

Text Book:

1. Ellis Horowitz, Sartaj Sahni, ―Fundamental Of Computer Algorithms.

Reference Books:

1. Aho, Hopcroft, Ullman, The Design And Analysis Of Computer Algorithms.
2. Sara Basse, ―Computer Algorithms – An Introduction to Design and Analysis.

Course Code	**MCA-402**	**L-3, T-1, P-0**	
Name of the Course	Web Technology-II		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time =3 hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Web Technology-II

Section-A

Introduction to server, Web server, Application Server. Installing and configuring Web server (Apache/Tomcat/Glassfish/IIS).Hypertext transfer Protocol.

Perl: Introduction, history and application of Perl, Pattern Matching in Perl, implementing programming logic in perl. Common Gateway Interface: CGI Linkage, Query string, cgi.pm, form handling using CGI-Perl.

Section-B

PHP: Overview of server side scripting, phpinfo(); embedding PHP Codes in HTML, generating HTML Codes using PHP. PHP Operators and Expressions. PHP Control Statements

PHP: Arrays. Functions, Pattern Matching, Form handling, File handling, cookies, Session Tracking; Database access using PHP and MySQL: Connecting to database-server, Selecting database, creating query, reading records from database, storing records in database.

Section-C

Role of Java in Server Programming (Introduction to Servlet and JSP),Setting up a Java Server (for servlet and JSP), Servlet Basics: Basic Structure, servlet life cycle, Handling Form Data, Handling HTTP Request, Generating HTTP Status Codes and Response Headers. Creating, managing, and deleting cookies, Handling session creating and deleting session, Session management, applying sessions (creation of shopping cart)

Section-D

JSP: an overview, Benefits of JSP, Installation of JSP Pages (on Tomcat, jRun, Resin), Building JSP, JSP Script elements, examples. JSP Page Directive., Model View,Controller (MVC).Accessing database: JDBC, Configuring Mysql Creating and Processing HTML Forms

Text Books:

1. Programming with world wide web by Robert Sebesta on Pearson.
2. Core Servlets and Java Server Pages Volume 1: Core Technologies Second Ed, Marty Hall & Larry Brown, Pearson.

Reference Books:

1. PHP and MySQL5 Larry Ulman, Pearson .
2. Core Servlets and Java Server Pages Volume 2: Advanced Technologies Second Ed, Marty Hall, Larry Brown & Yaakav Chaikin, Pearson.
3. Building PHP Applications With Symfony, CakePHP, And Zend, Framework by Bartosz Porebski Karol Przystalski Leszek Nowak, Wiley India.

Course Code	**MCA-403**	**L-3, T-1, P-0**	
Name of the Course	Operational Research		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Operational Research

Section-A

Introduction to O.R. – Definition, Uses and Limitations of Optimization method.The Linear Programming Problem: Introduction, Formulation Of LPP, Graphical Solution And Some Exceptional Cases, Canonical And Standard Form Of LPP. The Simplex Method: Solution of LPP By Simplex Method, Exceptional Cases, Artificial Variable Techniques (Big M), Two Phase Of Simplex Method, Problem of Degeneracy.

Section-B

The Dual Simplex Method: Dual And Primal Problem, Duality And Simplex Method, dual simplex method,Revised Simplex Method, Solution Of LPP Using Revised Simplex Method. Networking Scheduling By PERT/CPM: Introduction, Basic Concepts, Constraints In Network, Construction Of The Network, Time Calculation In Networks, Critical Path Method (CPM), PERT, PERT Calculation, Advantage Of Network (PERT/CPM).

Section-C

The Transportation Problem: Introduction, Basic Feasibility Solution, Standard Transportation Problem, Balanced Transportation Problem, Multicommodity Transportation Problem, Row Minimum, Column Minimum, Matrix Minimum Method, Vogel Approximation Method (VAM), Optimality In Transportation Problem,(stepping stone and modified distribution methods) Degeneracy In Transportation Problem, Assignment And Routing Problem.

Section-D

Game theory: Significance, essential features and limitations; Maximax and minimax principle, Game with pure & mined strategies, sul-game method (caseof 2xn or mx2 methods), Probability method, graphic method, algebraic method Inventory Control: Introduction, Inventory Control, Selective Control Techniques, ABC Analysis Procedure, Economics Lot Size Problems, Problem of EQQ With shortage, Inventory Control Techniques Uncertain Demand, Stochastic Problems.

Text Book:

1. Kanti Swarup, P.K. Gupta and Manmohan, ―Operations Research, Sultan Chand & Sons.New Delhi.

Reference Books:

1. H.A. Taha, ―Operation Research - An Introduction, Macmillan Publications.
2. S.D. Sharma, ―Operation Research, Kedar Nath Ram Nath & Company, Meerut.
3. K.K. Chawla, Vijay Gupta, Bhushan K Sharma, ―Operations Research: Quantization Analysis for Management, Kalyani Publishers, Kolkata.
4. V.K. Kapoor, ―Operation Research, Sultan Chand & sons, New Delhi.

Course Code	**MCA-404**	**L-3, T-1, P-0**	
Name of the Course	Mobile Computing		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Mobile Computing
Section-A

Introduction to Mobile Communications and Computing:
Mobile Computing (MC): Introduction to MC, applications, limitations, and architecture.
Cellular Overview : Cellular networks, Cellular concept, location management, Handoffs
Wireless LANs and Application overview: WLAN , Wireless applications , Mac issues(Hidden and exposed terminals, Near and far terminals), Mobile IP , Mobile ad-hoc networks(MANET) , TCP Issues , Disconnected operations , Data broadcasting , Mobile agents
GSM :Air-interface, channel structure, timing, Mobile Services (Bearer, Tele-and-supplementary services) ,System Architecture : Radio subsystem ,Network and switching subsystem ,Operation subsystem ,Protocols : Localization and calling , Handover ,Value Added Services : SMS ,Cell Broadcast Service ,MMS ,Location Services

Section-B

WAP: Architecture , Protocol stack , Application environment, - application demo
Database Issues : Hoarding techniques ,Caching invalidation mechanisms ,Client server computing with adaptation, Power-aware and context-aware computing, Transactional models, query processing, recovery, and quality of service issues.
Platform/Operating Systems for application development: Palm OS ,Windows CE ,Embedded Linux ,J2ME (Introduction) ,Symbian (Introduction)
Android application development : Overview of Android, Devices running android ,Why Develop for Android ,Features of android ,Architecture of Android, Libraries ,Software development kit

Section C

Designing the user interface : Introducing views and view groups, Introducing layouts, Creating new views, Creating and using Menus

Starting with Application Coding : Introducing Intents , Introducing Adapters , Using Internet Resources ,Introducing Dialogs ,Capturing Date and Time , Validating and Handling Input data

Accessing Location Based Services Application :Selecting Location Provider , Finding your location.,Creating map based activities

Section-D

Introduction to SQLite : Creating SQLite database, Editing Tasks with SQLite Cursors and content values , Working with Android database

Peer to peer to communication : Accessing Telephony Hardware, Introducing Android Instant Messaging , GTalk Service : Using, binding & Making connection , Managing chat Sessions , Sending and receiving Data messages ,Introducing SMS , Using, sending & Listening SMS Messages

Accessing Android Hardware : Audio, Video and Using the camera, Introducing Sensor Manager Android Telephony ,Using Bluetooth , Manage network and Wi-Fi connections

Text Books:

1. Mobile Communications J. Schiller, Addition Wesley Publication.
2. Professional Android™ Application Development Wrox Publications, Reto Meier
3. Hansmann, Merk, Nicklous, Stober, “Principles of Mobile Computing”, Springer, second edition.

Reference Books:

1. GSM System Engineering A.Mehrotra, Addition Wesley Publication
2. Understanding WAP M. Heijden, M. Taylor, Artech House Publication
3. Hello Android, Introducing Google’s Mobile Development Platform, Ed Burnette, Pragmatic Programmers,ISBN: 978-1-93435-617-3
4. Sams teach yourself Android application development, Lauren Dercy and Shande Conder, Sams publishing
5. Mobile Computing: Asoke K Talukdar, Roopa R. Yavagal, TataMcGrawHill

Course Code	**MCA-406(Lab)**	**L-0, T-0, P-2**	
Name of Course	**Fundamentals of Computer Algorithms Lab**		
Lectures to be delivered	52(P =52 For Each Semester)		
Semester End Examination	MM:50	Min. Pass Marks- 20	
Continuous Assessment	Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%		Max. Marks: 50

Suggested List of Practical Topics

- Elementary Data Structures
- Sets and Disjoint Set Union
- Divide and Conquer
  - Merge, quick and Selection Sort
  - Maximum and minimum
- Greedy Method
  - Knapsack Problem,
  - Minimum Spanning Trees,
  - Single Source Shortest Paths.
- Dynamic Programming.
  - 0/1 Knapsack,
  - Traveling Salesperson Problem,
  - Traversal Techniques
- Back Tracking
  - The 8 Queens Problem

Course Code	**MCA-407(Lab)**	**L-0, T-0, P-2**
Name of Course	Web Technology-II Lab	
Lectures to be delivered	52(P =52 For Each Semester)	
Semester End Examination	MM:50	Min. Pass Marks- 20
Continuous Assessment	Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%	Max. Marks: 50

Suggested List of Practical Topics

- Configuring Web servers
- Perl
  - Programming logic in perl
  - CGI
  - Form handling using CGI-Perl
- PHP
  - Generating HTML Codes using PHP
  - Operators and Expressions. Control Statements
  - Arrays, File handling, Form handling
- Database access using PHP and MySQL
- Servlet and JSP
- Sessions Management
- Cookies Management
- JSP.
- Model View,Controller (MVC)
- Accessing database

Course Code	MCA-501	L-3, T-1, P-0	
Name of the Course	Computer Graphics		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time =3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Computer Graphics

Section-A

Introduction: Definition Of Computer Graphics And Its Applications, Video Display Devices- Raster-Scan Displays, Random-Scan Displays, Color CRT Monitors, Direct View Storage Tubes, Flat Panel Displays Input Devices: Keyboard, Mouse, Trackball and Space ball, Graphic tablets, Joysticks, Digitizers, Image Scanners, Touch Panels, Light Pens, Voice Systems. Hard copy devices: Impact and non impact printers, such as line printer, dot matrix, laser, ink-jet, electrostatic, flatbed and drum plotters, 3-D viewing devices.

Section-B

Output Primitives: Line Drawing Algorithms (DDA, Bresenham‘s Circle) Generating Algorithm: Midpoint Circle Drawing Algorithm, Ellipse Generating Algorithm, Midpoint Ellipse Generating Algorithm, Character Generation, 2D Transformations: Translation, Rotation, Scaling, Reflection, Shear, Composite Transformation-Translation, Rotations, Scaling, area filling techniques, Affine transformation, Two dimensional viewing transformation and clipping (line, polygon and text).

Section-C

3-dimensional Graphics: Geometric transformations (translation, Scaling, Rotation, Reflection, Shearing), Composite transformations, Mathematics of Projections (parallel & perspective). 3-D viewing transformations and clipping.

Curves and Surfaces: Bezier Curves, B-Spline Curves, Fractal Geometry Methods, Octrees.

Section-D

Hidden line and surface elimination algorithms, z-buffer, scan-line, sub-division, Painter's algorithm. Illumination Models: Diffuse reflection, Specular reflection, refracted light, texture surface patterns, Halftoning, Dithering. Surface Rendering Methods: Constant Intensity method, Gouraud Shading, Phong Shading.

Text Book :

1. D. Hearn and M.P. Baker, “Computer Graphics”, PHI New Delhi; Latest Edition.

References Books:

1. J.D. Foley, A.V. Dam, S.K. Feiner, J.F. Hughes,. R.L Phillips, ”Introduction to Computer Graphics”, Addison-Wesley Publishing company, N.Y.; Second Edition,1994.
2. R.A. Plastock and G. Kalley, “Computer Graphics”, McGraw Hill, 1986

Course Code	**MCA-502**	**L-3, T-1, P-0**	
Name of the Course	ASP.NET using C#		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time = 3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

ASP.NET using C#

Section-A

.NET : Introduction to .Net Framework , Components of .NET Framework. Introduction to ASP.NET. Server Side Programming, ASP.NET as an alternative to CGI, Basics of HTML, ASP Editors (Visual Web developer, Monodevelop)understanding web forms, separating design logic and application logic. Concept of codeFile, creating hello world application.

Section-B

ASP Forms, handling button events, ASP controls, TextBox, CheckBox, RadioButton, DropDownList, ListBox, RadioButtonList, CheckBoxList; DataDisplay:TextBox, Label, Literal, Panel; Triggers, links and Images: Button, ImageButton, LinkButton, HyperLink, Image, ImageMap.

Introduction to C#: Naming Variables & instances, Datatypes, Statements, Expressions, Basic Structure, Operators, Control statements. Handling events with C#, Creating and Using Classes.

Section-C

Validation Controls: Types of Validation: RequiredField Validator, RangeValidator, RegularExpressionValidator, CompareValidator, CustomValidator.

Creating user controls, Registering User controls, Properties and Methods of user controls, dynamically loading user controls.

Data manipulation with ADO.NET: Overview, Opening Database Connection, Inserting Data using ADO.NET, Updating Data, Deleting, Querying Data.

Using Parameters with SQL Commands. Using Stored Procedures, understanding the concept of Datasets, DataTables, Adatpers. Saving Form Data, Binding data to form, Data List and Data Grid Control.

Section-D

Handling Errors in ASP, Themes and Master Pages, Creating a Consistent Web Site, ASP.NET 2.0 Themes, Master Pages Displaying Data with the GridView Control.

Managing State: Preserving State in Web Applications, Page-Level State, Using Cookies to Preserve State, ASP.NET Session State, Storing Objects in Session State, Configuring Session State, Setting Up an Out-of-Process State Server, Storing Session State in database Server, Using Cookieless Session IDs, Application State Using the DataList and Repeater Controls, Overview of List-Bound Controls, Creating a Repeater Control, Creating a DataList Control.

Text Books

1. Beginning ASP.NET 4: in C# and VB by By Imar Spaanjaars, Wrox

References:

1. Professional ASP.NET 2.0 , Wrox Publication
2. ASP .NET complete reference, publication Tata McHill
3. Asp.Net: Tips, Tutorials, and Code: Volume 1,Scott Mitchell ,Sams Publishing
4. Professional C# 4.0 and .NET 4
5. ASP.NET By Example, Steven A Smith, Que Publishing

Course Code	**MCA-503**	**L-3, T-1, P-0**	
Name of the Course	Artificial Intelligence		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time =3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Artificial Intelligence

Section-A

Introduction to AI: Definitions, Importance of AI, AI application Areas, Properties of WFF, Clausal form Inference rules, Unification Algorithm, resolution Principle, Non deductive Inference methods. Proportional Logic, FOPL, Clausal Form, Resolution in Predicate & Propositional Logic, dealing with Inconsistencies & uncertainties.

Section-B

Logic Programming AI Language PROLOG: PROLOG Terminology, Variable, Operators, Control Structures, Matching in Prolog, Backtracking, Program Flow, Strings, Recursion.

Section-C

Knowledge Base Systems: Components of knowledge Base System. Knowledge Representation: Types of knowledge, structured knowledge representation semantic nets, graphs, conceptual dependencies, frames, Scripts, Knowledge Organization and Manipulation: matching, Searching Techniques: Hill climbing, A*, AO*, Searching OR and AND-OR graphs, knowledge acquisition: learning.

Section-D

Natural language processing: Phonological, Morphological, syntactic processing, semantic analysis,discourse and pragmatic processing.

Expert System: Introduction, Rule Based Architectures, Non-Production System architecture, Applications, ES-Shells.

Text Book :

1. Dan W. Patterson, “Introduction to Artificial Intelligence and Expert Systems”, PHI.

Reference Books:

1. E. Rich and K. Knight," Artificial Intelligence", Tata McGraw Hill.
2. E. Charnaik and D. McDermott," Introduction to artificial Intelligence", Addison-Wesley Publishing Company.
3. Nils J. Nilson, “Principles of Artificial Intelligence”, Narosa Publishing Co.
2. W.F. Clofisin and C.S. Mellish, “Programming in PROLOG”, Narosa Publishing Co.
3. Sanjiva Nath, “Turbo PROLOG”, Galgotia Publications Pvt. Ltd.
4. M. Chandwick and J.A. Hannah, “Expert Systems for Personal Computers”, Galgotia Publications Pvt. Ltd.

Course Code	**MCA-504**	**L-3, T-1, P-0**	
Name of the Course	Compiler Design		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time = 3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Compiler Design

Section-A

Introduction to compilers and interpreters – Overview of compilation and different phases, Issues in compilation – structure of a compiler – compiler writing tools – bootstrapping – notations and concepts for languages and grammars – regular expressions – context free grammar, derivations and parse trees, BNF notations.

Section-B

Context of a lexical analyzer :construction of lexical analyzer, deterministic and non deterministic finite automata. Syntax analyzer, context free grammars, top down parsing, brute force parser, recursive descent parser, LL(1) parser, Bottom up parsing, operator precedence parsing, simple precedence parsing, LR parser, LALR parser, YACC – the parser generator.

Section C

Compile time error handling, error detection, reporting, recovery and repair. Intermediate languages, postfix notation, syntax trees, parse trees, three address code, triples and indirect triples. Translation of assignment statements, Boolean expressions, statements that alter flow of control array references, procedure calls, declarations, case statement, record structures. Symbol tables, operation on symbol tables, symbol table organization for non-block structured languages, symbol table organization for block – structured languages.

Section D

Run time storage management, storage allocation and referencing data in block structured language, storage allocation. Code optimization, sources of optimization, loop optimization, DAG and optimization of basic blocks. Code generation, a machine model, next use information register allocation and assignment, a simple code generator, code generation from DAG's, Peephole optimization.

Text books:

1. Alfred V Aho and Jeffery D Ullman Principles of Compiler Design , Narosa/Addison Wesley

Reference Books:

1. Aho, Sethi,& Ullman., Compilers Principles, Techniques and Tools , Addison Wesley
2. Jean Paul Tremblay and Sorenson., The Theory and Practice of Compiler Writing McGraw Hill

Course Code	**MCA-506(Lab)**	**L-0, T-0, P-2**
Name of Course	Computer Graphics Lab	
Lectures to be delivered	52(P =52 For Each Semester)	
Semester End Examination	MM: 50	Min. Pass Marks- 20
Continuous Assessment	Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%	Max. Marks: 50

Suggested List of Practical Topics

- Line drawing algorithms
- Circle generating algorithms
- Ellipse generating algorithms
- 2D Transformations
- 2D Viewing transformation and clipping.
- 3D Transformations
- 3-D viewing transformations and clipping.

Course Code	**MCA-507(Lab)**	**L-0, T-0, P-2**
Name of Course	ASP.NET using C#	
Lectures to be delivered	52(P =52 For Each Semester)	
Semester End Examination	MM: 50	Min. Pass Marks- 20
Continuous Assessment	Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%	Max. Marks: 50

Suggested List of Practical Topics

- Basics of HTML
- ASP Editors
- ASP Forms
- Handling Buttons
- Basics of C#.
- Handling events with C#,
- Validation Controls.
- Creating user controls
- Data manipulation with ADO.NET
- Using Parameters with SQL Commands
- Creating a Consistent Web Site
- Managing State in Web Applications
- Overview of List-Bound Controls

Course Code	**MCA-E41**	**L-3, T-1, P-0**	
Name of the Course	Distributed Operating System		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time = 3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Distributed Operating System

Section-A

Fundamentals: Distributed computing, system model, distributed operating system, designing operating system, Introduction to DCE

Message Passing : Desirable features message passing system, Issues in message passing, synchronization, buffering, multidatagram messages , Encoding and decoding of message data, Process addressing, Failure handling, Group communication.

Section-B

Remote procedure call: RPC model, Transparency of RPC, implementing RPC mechanism, Stub generation, Marshaling arguments and Results, Server Management, Parameter-passing Semantics , call Semantics, Communication protocols for RPCs, Complicated RPC Client server binding, Exception Handling , Security, special types of RPCs, RPCs in Heterogeneous Environments, Lightweight RPC, Optimizations for better performance.

Distributed Shared Memory: General architecture of DSM systems, Design and implementation of DSM, Granularity, structure of shared memory space, consistency models, Replacement Strategy, Thrashing, other approaches to DSM, Heterogeneous DSM, and Advantages of DSM

Section-C

Synchronization: clock synchronization, event ordering, mutual exclusion, Deadlock, Election Algorithm

Resource and Process Management: Desirable Features of global Scheduling algorithm, Task assignment approach, Load balancing approach, load sharing approach, Introduction to process management, process migration, Threads

Section-D

Distributed File Systems: Introduction, good features of DFS, File models, File Accessing models, File sharing Semantics, File-Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions and design principles.

Naming : Introduction, Desirable features of Naming system, Fundamental concepts, System oriented Names, Object locating mechanisms, human oriented Names, Name Caches and Naming and Security

Text Books:

1. Pradeep K Sinha " Distributed Operating Systems : Concepts and design" IEEE computer society press
2. Tanuenbaum "Distributed Operating System" Pearson Edition
3. PUDER, ROMER "Distributed Systems Architecture : Middleware approach" ELSEVIER publication

References:

1. G. Coulouris, J. Dollimore and T. Kindberg "Distributed Systems : Concepts and design" Pearson Edition
2. M. Singhal, N. Shivaratri " Advanced Concepts in Operating Systems" TMH

Course Code	**MCA-E42**	**L-3, T-1, P-0**	
Name of the Course	Simulation and Modeling		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time =3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Simulation and Modeling

Section-A

Definition of System, types of system : continuous and discrete, modelling process and definition of a model, computer workloads and preparation of its models.

Section-B

Verification and validation modeling procedures, comparing model data with real system data, differential and partial differential equation models, combining discrete event and continuous models.

Section-C

Simulation process: Use of simulation, discrete and continuous simulation procedures, simulation of time sharing computer system

Section-D

Simulation Languages: A brief introduction to important discrete and continuous simulation languages, one language may be studied in detail depending on the availability.

Text Books:

1. Gordon G., ―System Simulation, PHI.

Reference Books:

1. Banks J., Carson S., Nelson B.L., ―Discrete-Event System Simulation, 2nd Edition, Prentice Hall of India, N. Delhi, 1996.
2. Deo N., ―System Simulation with Digital Computers, Prentice Hall of India, 1979.
3. Law A.M., Kelton W.D., ―Simulation Modeling and Analysis‖, 2nd Edition, McGraw Hill, N.Y., 1991.

Course Code	MCA-E43	L-3, T-1, P-0	
Name of the Course	Information Security		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time = 3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Information Security

Section-A

Introduction to Information Security: History and evaluation of Information security CIA triangle ,Components of IS, Control in IT environment, Information security Management system, components of ISMS and conceptual framework , Steps for developing ISMS

Need of Information security: Threats to information security, Risk to Information systems Information security in organization, Introduction to cyber crimes and attacks , Information security policy, policy definition and security life cycle.

Section-B

Information Security Policy and Standards: Security principles , Types of Information security policies- Administrative and Technical ,A structure and framework of compressive security policy, policy infrastructure, policy design life cycle and design processes, PDCA model, Security policy standards and practices - BS7799, ISO/IEC 17799, ISO 27001. Auditing tools such as ISO 27001 ISMS TOOL KIT, NGS AUDITOR, Windows password auditor, ISO IES 27002 2005 IS AUDIT TOOL

Section-C

IT Governance: What is IT Governance, good governance, objectives and dimensions, foundation, structure, processes ,IT governance framework- COBIT, ITIL, ISO 17799, IT governance maturity model . Ethical hacking

Section-D

Audit:Auditing concepts ISA need, concept, standards, performance, steps, Techniques, methodologies, around and through computer, Controls – Concept objectives, types, risk.

Controls : Input, process, validation, output, logical access, physical access , Database, network, environment, BCP, Evidence collection, evaluation and Reporting methodologies.

Text Books:

1. Information security policies, procedures and standards by Thomas Pettier.
2. Information security Management Hand book- 5th Edition-HAROLD F. TIPTON
3. Computer security by Alfred Basta, Wolf Halton

Reference Books:

1. Information security policies- Thomas R.Peltier, Peltier R. Peltier
2. Electronic Signature law by L Padmavathi
3. Network Security by Ankit Fadia
4. Security Plus study guide by Michael Cross, Norrris Johnson
5. Information systems control and Audit by Ron Weber, Pearson Pub.
6. IS control journals from ISACA
7. Information Systems Security: Security Management, Metrics, Frameworks And Best Practices (With Cd) : Nina Gobole
8. Information Security policies made easy version 10: Charles Cresson Wood

Course Code	**MCA-E44**	**L-3, T-1, P-0**	
Name of the Course	Parallel Computing		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time = 3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Parallel Computing

Section-A

Parallel Computers-Introduction: The Demand of Computational Speed, Types of Parallel Computers, Architectural Features of Message passing Multicomputer, Networked Computers as a Multicomputer Platform, Potential for increased computational speed.

Parallel Computer Architecture: A Taxonomy of Parallel Architectures, Control Mechanism, Address-space Organization, Interconnection Networks, Processors Granularity ;SIMD Architecture : Overview of SIMD Architecture, Design and Performance Issues; MIMD Architecture : Shared Memory Architecture, Uniform and Non-uniform Memory Access Multi Processors, Parallel Vector Processors (PVP), Symmetric Multiple Processors (SMP), CC-NUMA, NUMA and COMA Architectures ;Distributed Memory Architecture : Cluster Architecture - Design and other Issues ,MPP Architecture

Section-B

System Interconnection and Gigabit Network Basics of Interconnection Network, Network Topologies and Properties, Buses, Crossbar, and Multistage switches, Gigabit Network Technologies, Comparison of Network Technologies

Parallel Programming: Paradigms and Programmability : Algorithmic Paradigms, Programmability issues Parallel Programming Examples; Parallel Programming Models : Implicit Parallelism, Explicit Parallel Models, Other Parallel Programming Models ;Shared Memory Programming : The POSIX Threads (P-threads) Model, The Open MP Standard; Message-Passing Programming : The Message Passing Paradigm, Message Passing Interface (MPI), Parallel Virtual Machine (PVM);Data Parallel Programming : The Data Parallel Model, The Fortran 90 Approach, Other Data Parallel Approaches

Section-C

Performance Metrics and Benchmarks: Performance Metrics for Parallel Systems: Run Time, Speedup, Efficiency Cost.; Scalability and Speedup Analysis: Amdahl's Law: Fixed Problem Size, Gustafson's Law: Fixed Time, Sun and Ni's Law: Memory Bounding, Iso performance

Models; System and Application Benchmarks : Micro Benchmarks, Parallel Computing Benchmarks, Business and TPC Benchmarks, SPEC Benchmark Family ; Performance v/s Cost, Performance of parallel Computers, Performance of Parallel Programs Parallel Paradigms and Programming Models: Parallel Programming Models: Implicit Parallelism, Explicit Parallel Models, Other Parallel Programming Models; Shared Memory Programming: The POSIX Threads (P-threads) Model, The Open MP Standard;

Section-D

Message-Passing Programming: The Message Passing Paradigm, Message Passing Interface (MPI), Parallel Virtual Machine (PVM); Data Parallel Programming: The Data Parallel Model, the FORTRAN 90 Approach, Other Data Parallel Approaches

Parallel Algorithms and Applications Sorting Algorithms, Searching Algorithms, Dynamic Programming, Matrix Multiplication, Dense Matrix Computations, Sparse Matrix Computations

Text Books:

1. Kai Hwang and Zhiwei Xu, "Scalable Parallel Computing", 1997, McGraw Hill New York.
2. Barry Wilkinson and Michael Allen, "Parallel Programming", 1999, Pearson Education Asia.

Reference Books:

1. Steven Brawer, " Introduction to Parallel Programming"
2. M. Shasikumar, Dinesh shikhare and P. Ravi Prakash, "Introduction to Parallel Processing".
3. V. Rajaraman and C. Siva Ram Murthy, "Parallel Computers-Architecture and Programming"

Course Code	**MCA-E45**	**L-3, T-1, P-0**	
Name of the Course	Cloud Computing		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time = 3 hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Cloud Computing

Section-A

Introduction to Cloud Computing, Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud, Comparison among SAAS, PAAS, IAAS

Cloud computing platforms: Infrastructure as service: Amazon EC2,Platform as Service: Google App Engine, Microsoft Azure, Utility Computing, Elastic Computing

Section-B

Introduction to Cloud Technologies, Study of Hypervisors

Compare SOAP and REST **Webservices, AJAX and mashups**-Web services: SOAP and REST, SOAP versus REST, AJAX: asynchronous 'rich' interfaces, Mashups: user interface services **Virtualization Technology**: Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization

Multitenant software: Multi-entity support, Multi-schema approach, Multi-tenance using cloud data stores, Data access control for enterprise applications,

Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud

Section-C

Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Introduction to cloud development, Example/Application of Mapreduce, Features and comparisons among GFS,HDFS etc, Map-Reduce model . Issues in cloud computing, Implementing real time application over cloud platform. Issues in Intercloud environments, QOS Issues in Cloud, Dependability, data

migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment.

Section-D

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud

Cloud computing security architecture: Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures; Identity Management and Access control-Identity management, Access control, Autonomic Security

Cloud computing security challenges: Virtualization security management- virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud. Cloud computing platforms, Installing cloud platforms and performance evaluation. Features and functions of cloud platforms: Xen Cloud Platform, Eucalyptus, OpenNebula, Nimbus, TPlatform, Apache Virtual Computing Lab (VCL), Enomaly Elastic Computing Platform.

Text Book:

1. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition)
2. Enterprise Cloud Computing by Gautam Shroff,Cambridge
3. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India

Reference Book:

1. Google Apps by Scott Granneman,Pearson
2. Cloud Security & Privacy by Tim Malhar, S.Kumaraswammy, S.Latif (SPD,O'REILLY)
3. Cloud Computing : A Practical Approach, Antohy T Velte, et.al McGraw Hill,
4. Cloud Computing Bible by Barrie Sosinsky, Wiley India
5. Stefano Ferretti et.al.,‖QoS–aware Clouds", 2010 IEEE 3rd International Conference on Cloud Computing

Course Code	**MCA-E51**	**L-3, T-1, P-0**	
Name of the Course	Data Warehousing and Data Mining		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time =3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Data Warehousing and Data Mining
Section-A

Introduction: DSS, Data warehouse Architecture, Data Staging & ETL, Multidimensional Model, Meta data, Accessing data warehouse, ROLAP, MOLAP, HOLAP System Lifecycle: Risk factors, Top-down, Bottom-up, Data mart design phases, Methodological framework, Testing data marts Data Sources: Inspecting and normalizing schemata, Integration problems, Integration phases, Mapping User Requirements & Conceptual Modeling: Glossary based requirements analysis, Goal-oriented requirements analysis, Dimensional Fact Model, Advanced modeling, Events and Aggregation, Time, Formalizing the dimensional fact model Conceptual Design: ER schema based design, Relational schema based design, XML schema based design, Mixed approach design.

Section-B

Logical Modeling & Design: MOLAP, HOLAP & ROLAP systems, Views, Temporal scenarios, Fact schemata to star schemata, View materialization, View Fragmentation, Populating - reconciled databases, dimension tables, fact tables & materialized views, Cleansing data Data Warehouse Components: Overall architecture, database, Sourcing, acquisition, cleanup and transformation tools, Metadata, Access tools, Administration and management, Info delivery System Building a Data Warehouse: Considerations - business, design, technical & implementation, Integrated solutions, Benefits

Section-C

Mapping Data Warehouse to a Multiprocessor Architecture: Relational database technology, Database architectures for parallel processing, Parallel RDBMS features and vendors DBMS Schemas & Decision Support: Data layout for best access, Multidimensional data models, Star schema Data Tools and Metadata: Tool requirements, Vendor approaches, Access to legacy data, Transformation engines, Metadata - definition, interchange initiative, repository, trends, Reporting & Query Tools – categories OLAP: Need, Multidimensional data model, guidelines, Multidimensional Vs multirelational OLAP, Categorization of OLAP tools.

Section-D

Introduction: Data mining, Measuring effectiveness, Discovery Vs prediction, Overfitting, Comparing the technologies, Decision trees, Where to use them, General idea, How do they work, Strengths and weaknesses

Techniques and Algorithms: Neural networks - uses, making predictions, different kinds, Kohonen feature map, their working, Nearest Neighbour & Clustering – uses, predictions and differences, their working, Genetic Algorithms – uses, cost minimization, cooperative strategies, their working, Rule Induction – uses, evaluation of rules, rules Vs decision trees, their working, Using the right technique, Data mining & business process

Text Books:

1. Data Warehousing, Data Mining & OLAP, Alex Berson & Stephen J. Smith, Tata McGraw-Hill, 2009.
2. Data Warehouse Design: Modern Principles and Methodologies, Matteo Golfarelli, Stefand Rizzi, Tata McGraw-Hill, 2009.

Reference Books:

1. Decision support and data warehouse systems, Efrem Mallach, Tata McGraw-Hill, 2009.
2. The Data Warehouse Lifecycle Toolkit: Practical Techniques for Building Data Warehouse and Business Intelligence Systems, John Wiley & Sons, 2008

Course Code	**MCA-E52**	**L-3, T-1, P-0**	
Name of the Course	Data Warehousing and Data Mining		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time=3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Section-A

Operating System Concepts: Overview of OS. System Calls, Process Management, Memory Management, Disk and filesystems, Networking, Security, Graphical User Interface, Device Drivers.

Linux Usage and Basics: Linux Origins, Logging in to a Linux System, Switching between virtual consoles and the graphical environment, Elements of the X Window System, Starting the X server, Changing your password, The root user, Changing identities, Editing text files.

Running Commands and Getting Help: Running Commands, Some Simple commands, Getting Help, The whatis command, The – help Option, Reading Usage Summaries, The man command, Navigating man pages, The info command, Navigating info pages.

Browsing the Filesystem: Linux File Hierarchy Concepts, Some Important Directories, Current Working Directory, File and Directory Names, Absolute and Relative Pathnames, Changing Directories, Listing Directory Contents, Copying Files and Directories, Copying Files and Directories: The Destination, Moving and Renaming Files and Directories, Creating and Removing Files, Creating and Removing Directories, Using Nautilus, Determining File Content.

The X-Window System: XOrg: The X11 Server, XOrg Server Design, XOrg Server Configuration, XOrg Modularity, Server and Client Relationship, XOrg in runlevel 3, XOrg in runlevel 5, Configuration Utilities, Remote X Sessions.

Section-B

Users, Groups and Permissions: Users, Groups, Linux File Security, Permission Precedence, Permission Types, Examining Permissions, Interpreting Permissions, Changing File Ownership, Changing Permissions – Symbolic Method, Changing Permissions – Numeric Method, Changing Permissions – Nautilus

Advanced Topics in Users, Groups and Permissions: User and Group ID Numbers, /etc/passwd, /etc/shadow and /etc/group files, User Management tools, System Users and and Groups, Monitoring Logins, Default Permissions, Special Permissions for Executables, Special Permissions for Directories.

The Linux Filesystem: Partitions and Filesystems, Inodes, Directories, Inodes and Directories, cp and inodes, mv and inodes, rm and inodes, Hard Links, Symbolic (or soft)

Links, The Seven Fundamental Filetypes, Checking Free Space, Removable Media, Mounting CDs and DVDs, Mounting USB Media, Mounting Floppy Disks, Archiving Files and Compressing Archives, Creating, Listing and Extracting File Archives, Creating File Archives: Other Tools.

An advanced Tex Editor: Introducing vim, vim: A Modal Editor, vim basics, Opening a file in vim, Modifying a file, Saving a file and exiting vim, Using Command Mode, Moving around, Search and Replace, Manipulating Text, Undoing changes, Visual Mode, Using multiple "windows", Configuring vi and vim, Learning more.

Section-C

Standard I/O and Pipes: Standard Input and Output, Redirecting Output to a File, Redirecting STDOUT to a Program(Piping), Combining Output and Errors, Redirecting to Multiple Targets (tee), Redirecting STDIN from a file, Sending Multiple Lines to STDIN.

Using the Bash Shell: Bash Introduction, Bash Heritage and Features, Command Line Shortcuts, History Tricks, Command Line Expansion, Command Editing Tricks, gnome-terminal.

Configuring the Bash Shell: Bash Variables, Environment variables, The TERM Environment variable, The PATH Environment variable, Some common variables, Aliases, How bash expands a Command Line, Preventing Expansion, Login vs non-login shells, Bash startup tasks: profile, Bash startup tasks: bashrc, Bash exit tasks.

Text Processing Tools: Tools for Extracting Text, Viewing File Contents, Viewing File Excerpts, Extracting Text by Keyword, Extracting Text by column, Tools for analyzing text, Gathering text statistics, Sorting Text, Eliminating Duplicate Lines, Comparing Files, Duplicating File Changes, Spell Checking with aspell, Tools for manipulating Text, sed, Special Characters for Complex Searches.

Shell Programming: Scripting Basics, Creating Shell Scripts, Generating Output, Handling Input, Exit Status, Control Structures, Conditional Execution, File Tests, String Tests, for and sequences, continue and break, Using positional parameters, handling parameters with Spaces, Scripting at the command line, Shell Script debugging.

Section-D

Investigating and Managing Processes: What is a Process? ,Listing Processes, Finding Processes, Signals, Sending Signals to Processes, Scheduling Priority, Altering Scheduling Priority, Interactive Process management tools, Job Control, Scheduling a Process to execute later, Crontab File format.

Finding and Processing Files: locate, locate Examples, find, Basic find Examples, find and logical Operators, find and Permissions, find and Numeric Criteria, find and Access Times, Executing commands with find, find Execution Examples, The GNOME Search Tool.

Basic System Configuration Tools: TCP/IP Network Configuration, Managing Ethernet Connections, Graphical Network Configuration, Network Configuration Files, Printing in Linux, Setting the System's Date and Time, Managing Services.

Text Books:

1. Maurice J. Bach, "Design of the Unix Operating System", Third Edition,2000,PHI.
2. Sumitabha Das, "Unix : Concepts and Applications", Third Edition, 2006,Tata McGraw Hill
3. ISRD Group, Basics of OS, UNIX and SHELL Programming" TMH (2006)

Reference Books:

1. A User guide to unix system",Thomas Rebecca yate,Second Edition,2002,.Tata McGraw Hill.
2. Stephen Prata "Advanced Unix -A programmer's Guide".

Course Code	**MCA-E53**	**L-3, T-1, P-0**	
Name of the Course	Advanced Computer Networks		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time= 3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Advanced Computer Networks

Section-A

Introduction: Protocols and standards, Standards Organizations, Internet Standards, Internet Administration; Overview of reference models: The OSI model, TCP/IP protocol Suite, Addressing, IP versions. Connectors, Transceivers and Media converters, Network interface cards and PC cards, Repeaters, Hubs, Bridges, Switches, Routers and Gateways etc. H/W selection.

Optical Networking: SONET/SDH standards, Dense Wavelength division multiplexing (DWDM), Performance and design Considerations.

Section-B

ATM: The WAN Protocol : Faces of ATM, ATM Protocol operations (ATM cell and Transmission) ATM Networking basics, Theory of Operations, B-ISDN reference model, PHY layer , ATM Layer (Protocol model), ATM layer and cell, Traffic Descriptor and parameters, Traffic Congestion control defined, AAL Protocol model, Traffic contract and QoS, User Plane overview, Control Plane AAL, Management Plane, Sub-DS3 ATM, ATM public services.

Packet Switching Protocol: X.25, theory of Operation and Network Layer functions, X.75, Inter networking protocols, SMDS , Subscriber Interface and Access Protocol, Addressing and Traffic Control.

Section-C

Common Protocols and interfaces in upper Layer: TCP/IP suite, Network Layer, Transport Layer, Applications Layer, Addressing and routing design, Socket programming.

Routing in the Internet: Intra and inter domain routing; Unicast Routing Protocols: RIP, OSPF, BGP; Multicast Routing Protocols: MOSPF, DVMRP. Drawbacks of traditional routing methods, Idea of TE, TE and Different Traffic classes. IP over ATM, Multi protocol Label switching (MPLS), Storage Area Networks (SAN).

Network Management and Services: SNMP: Concept, Management components, SMI, MIB, SNMP format, Messages

Section-D

Traffic Engineering and Capacity Planning: Traffic engineering basics: Requirement Definitions: Traffic sizing, characteristics, Protocols, Time Delay considerations, Connectivity, Reliability, Availability and Maintainability, Throughput calculations Quality of Service: Introduction, Application, Queue Analysis: M/M/1 as a packet processing Model, QoS Mechanisms Queue management Algorithms, Feedback, Resource reservation ; Queued data and Packet switched traffic modeling. Application and QoS, Network Performance Modeling, Creating Traffic Matrix, Capacity Planning and Network vision, Design Tools.

Multi-Media over Internet: RTP, RSVP, IP Multicasting, Voice Digitization standards, G.729 and G.723 and H.323 Enterprise Network Security: DMZ, NAT, SNAT, DNAT, Port Forwarding, Pr oxy, Transparent Proxy, Packet Filtering and Layer 7 Filtering.

Backbone Network Design: Backbone Requirements, Network Capacities Topologies, Topologies Strategies, Tuning Networks

Text Books

1. B. A. Forouzan, "TCP/IP Protocol Suite", Tata McGraw Hill edition, Third Edition.
2. N. Olifer, V. Olifer, "Computer Networks: Principles, Technologies and Protocols for Network design", Wiley India Edition, First edition.

References:

1. W.Richard Stevens, "TCP/IP Volume1, 2, 3", Addison Wesley.
2. D.E.Comer, "TCP/IP Volume I and II", Pearson Education.
3. W.R. Stevens, "Unix Network Programming", Vol.1, Pearson Education.
4. J.Walrand, P. Varaiya, "High Performance Communication Networks", Morgan Kaufmann
5. A.S.Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.

Course Code	**MCA-E54**	**L-3, T-1, P-0**	
Name of the Course	Software Quantity Assurance		
Lectures to be delivered	52(L=39, T=13 For Each Semester)		
Semester End Examination	Max. Time =3hrs.	Max. Marks: 60	Min. Pass Marks: 24
Continuous Assessment (based on Sessional tests (2) 60%, Tutorials/Assignments 20%, Quiz/Seminar 10%, Attendance 10%)			Max. Marks: 40

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

Software Quantity Assurance

Section-A

Software and Quality Concept: Objectives, overview, Software perspective, Software Quality, Software Quality Assurance, Software Quality models, Software Quality measurement and metrics. Assuring Software Quality Assurance (SQA): Objectives, goals, responsibilities, life cycle, SQA planning, SQA monitoring and controlling, testing, setting standards and procedures, Developing and controlling relevant metrics, SQA activities-revision, process evaluation, software standards.

Section-B

Software Quality Meterics: Objectives, Software metrics, Software Quality metrics framework, Software Quality metrics features, Development of software quality metrics-SATC‘s approach, Kitchenham‘s approach, Abreu‘s approach, Victor‘s approach, Selection of Software Quality metrics- Size related metrics, complexity metrics, Halstead metrics, quality metrics. Software Quality Models: Objectives, Hierarchical model- factor-criteria-metrics model, McCall‘s model, Boehm model, ISO 9126 model, Dromey‘s Quality model, Non-hierarchical model-Bayesian belief networks, star model, capability maturity models.

Section-C

Software Testing: Introduction, Definition (testing, fault, error, failure, bug, mistake), test oracle, test case, Process, Limitations of Testing. Functional Testing: Boundary Value Analysis- Introduction & Definition, Generalising, limitations, Robustness testing, Worst case testing, Test cases. Equivalence Class Testing - Introduction & Definition, Weak normal, strong normal, Weak robust, Strong robust, Test cases. Decision Table Based Testing- Introduction & Definition, technique, test cases.

Section-D

Structural Testing: Path testing - Introduction & definition, DD-path, Test coverage metrics, McCabe‘s basis path method, its observations and complexity. Data Flow Testing: Definition,

data flow graphs, data flow model, Data flow testing strategies. Levels of Testing: Traditional view of testing levels, Integration Testing (Decomposition based integration), Unit Testing, System Testing. Metrics and Complexity: Metrics definition, objectives, Linguistic Metrics: definition, LOC, Statement counts, Related metrics, Halstead‘s Metrics, Token count. Structural Metrics -Definition, Cyclomatic complexity, Hybrid Metrics.

Text Books:

1. R A Khan, K Mustafa, SI Ahson, ―Software Quality- Concepts and Practices, Narosa Publishing House,
2. Boris Beizer, ―Software Testing Techniques, Dreamtech press.
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