BANGALORE UNIVERSITY

REGULATIONS, SCHEME AND SYLLABUS

For the course

MASTER OF COMPUTER APPLICATIONS (MCA)

I to VI Semesters

(Choice Based Credit System –Y2K14 Scheme)

Revised w.e.f.

Academic Year 2014-15 and onwards

MCA PROGRAMME
JNANABHARATHI CAMPUS
BANGALORE UNIVERSITY, BANGALORE
BANGALORE UNIVERSITY

Regulations of Master of Computer applications (MCA) Course

1 TITLE OF THE COURSE: The course shall be called MCA – Master of Computer Applications.

2 DURATION OF THE COURSE: The course of study shall be three years.

3 ELIGIBILITY FOR ADMISSION: A candidate with any degree of a minimum of 3 years duration (10+2+3) of Bangalore university or of any other University equivalent there in to with a minimum of 50% of marks in the aggregate of all subjects including languages, if any, provided further, that the candidate has studied mathematics / Computer science /Business Mathematics / Statistics / Computer Applications / Electronics as a subject at PUC level or equivalent HSC (XII Standard) or at Degree level is eligible for admission to MCA Course. Relaxation to SC/ST, Group I be extended as per University norms.

4 ATTENDANCE: In each Semester a candidate should be considered to have successfully undergone the prescribed Course of study if the candidate has attended at least 75% of the classes in each subject (Theory, Lab & Practical).

5 SCHEME OF EXAMINATION:
   A The Internal Assessment marks should be decided for each of the theory subjects by conducting 2 tests, each of 60 minutes duration, spread over the span of a Semester. A seminar should also be given by the student in the third year and the same to be assessed and evaluated for internal assessment along with the two tests.
   B The Internal Assessment marks in Practical course is based on the performance in the Laboratory. The Internal Assessment marks for Project work of a candidate is based on the dissertation Seminar.

6 ELIGIBILITY TO GO TO THE HIGHER SEMESTER:
   A A Candidate is allowed to carry over all the previous uncleared (failed) theory papers and Practicals to subsequent semesters from the first to sixth semester.
   B The maximum period for completion of the course shall be six years from the date of admission.

7 MINIMUM FOR PASS AND DECLARATION OF RESULTS
   A For a pass in a semester, a candidate shall secure a minimum of 40% of the marks prescribed for a subject in the University Examination (Theory, Practical, Project work) and 50% of the marks in the aggregate inclusive of the Internal Assessment marks obtained in all subjects put together.
   B The candidates who do not satisfy 7(a) shall be deemed to have failed and have to take exams in the subjects in which he has secured less than 40% at the University examination.
C Provision is made for rejection of results of all the subjects of a Semester only once, if the candidate decides to reappear for all the subjects of that semester. Such rejection should be made within 30 days of announcement of result, by making a written application, through the Head of the Institution. If such rejection is in respect of the results of all the subjects of one semester and earn fresh Internal marks as well.

D The results of any semester will be declared as pass or fail as the case may be in accordance with regulation 7(a).

E To be eligible for the award of the MCA degree, a candidate shall have completed the scheme of training and passed in all subjects prescribed for the Course.

F Further to regulation 7(a), the classification followed by the University for all PG courses shall be made applicable for the declaration of results of each Semester.

8 CLASSIFICATION OF RESULT FOR THE MCA COURSE AND DECLARATION OF RANKS:
Further to regulations 7(a) and 7(f), the names of all successful candidates securing First Class with Distinction and First Class in the First attempt shall be arranged in the order of Merit and only first FIVE Ranks shall be declared.

9 A candidate shall complete examinations of all Semesters of MCA Course within SIX years from the date of admission
<table>
<thead>
<tr>
<th>Sem</th>
<th>Paper Code</th>
<th>Title of the paper</th>
<th>Hours / Week</th>
<th>Marks</th>
<th>Credits</th>
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<td>MCA101T</td>
<td>Problem Solving Techniques using C</td>
<td>4</td>
<td>30</td>
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<td>Accounting and Financial Management</td>
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Students have to choose any two Electives from the given list in the Sixth semester.

1. Software Testing
2. e-Governance
3. Data Mining
4. Big Data Analytics
5. Cloud Computing
6. Parallel Algorithms
7. Image processing
8. Mobile Computing
9. Compiler Design
10. TCP / IP
11. Storage Area Network
12. Multimedia Communication
13. Distributed Operating Systems
FIRST SEMESTER MCA

MCA101T: PROBLEM SOLVING TECHNIQUES USING C
Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [12 Hours]
Introduction to Programming Concepts: Software, Classification of Software, Modular Programming, Structured Programming, Algorithms and Flowcharts, Writing algorithms and drawing flowcharts for simple exercises. Overview of C Language: History of C, Character set, C tokens, Identifiers, Keywords, structure of C program, executing a C program. Constants, variables, data types, declaration of variables, declaration of storage classes, assigning values to variables defining symbolic constants, declaring a variable as constant, declaring a variable as volatile, overflow and underflow of data, Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions.

UNIT – II [10 Hours]
Managing Input and Output Operations: The scanf() & printf() functions for input and output operations, reading a character, writing a character, (the getchar() & putchar() functions), the address operator(&), formatted input and output using format specifiers, Writing simple complete C programs. Control Statements: Decision making with if statement, simple if statement, the if else statement, nesting of if else statements, the else If ladder, the switch statement, the?: operator, the goto statement, the break statement, programming examples. Loop Control Structures: The while statement, the do While statement, the for statement, nested loops, jumps in loops, the continue statement, programming examples.

UNIT – III [10 Hours]
Functions: Function Definition, prototyping, types of functions, passing arguments to functions, Nested Functions, Recursive functions. Arrays: Declaring and Initializing, One Dimensional Arrays, Two Dimensional Arrays, Multi Dimensional Arrays - Passing arrays to functions. Strings: Declaring and Initializing strings, Operations on strings, Arrays of strings, passing strings to functions. Storage Classes - Automatic, External, Static and Register Variables.

UNIT – IV [10 Hours]
Structures and Unions: Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members, array of structures, structures within structures, structures and functions, Unions, size of structures, bit fields, programming examples. Pointers: Understanding pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, chain of pointers, pointer expressions, pointers and arrays, pointer and character strings, array of pointers, pointer as function arguments, functions returning pointers, pointers to functions, pointers and structures, programming examples.
UNIT – V
File Management in C: Defining and opening a file, closing a file, input/output operations on files, error handling during I/O operations, random access files, command line arguments, programming examples. Dynamic Memory Allocation: Dynamic memory allocation, allocating a block of memory: malloc, allocating multiple blocks of memory: calloc, releasing the used space: Free, altering the size of a block: realloc, programming examples. The Preprocessor: Introduction, macro substitution, files inclusion, compiler control directives, ANSI additions, programming exercises.

Reference
UNIT - I

UNIT - II
Company accounts: features of company, types of companies advantages of companies, types of shares and debentures. Preparation of Final accounts of companies. (simple problems only).

UNIT - III

UNIT - IV
Ratio Analysis, Fund flow statement & Cash flow statement.

UNIT - V

Reference
UNIT – I

UNIT – II
Karnaugh maps- Definition of Karnaugh map, K- map for 2, 3 and 4 variables. Conversion of truth tables into k-map, grouping of cells, redundant groups and don’t care conditions. Karnaugh map technique to solve 3 variable and 4 variable expressions. Simplification of 3 and 4 variable Boolean expression using K-maps. AND Gate, OR Gate, NOT Gate, NAND Gate and NOR Gate - Definition, Symbol, Expression, Truth Table. Combinational logic circuits: Definition, applications. Half Adder: Symbol, Logic circuits using XOR and basic gates, Truth table. Full Adder: Symbol, Logic circuits using XOR and basic gates, Truth table.

UNIT – III

UNIT – IV
Addressing modes: Immediate addressing, register addressing, memory addressing, indexed addressing with displacement, I/O port addressing. 8086 Instructions: Instruction template for 8086 instructions, code generation using template. Data Transfer Instruction: Move data to register/memory from register/memory/immediate data, data transfer between a segment register and register/memory, PUSH and POP, exchange, data transfer with I/O ports.
UNIT – V


Reference

UNIT – I  [12 Hours]

UNIT – II  [10 Hours]
Fundamentals of Logic: Proposition, Logical Connectives and Truth Tables, Logic Equivalence – The Laws of Logic, Logical Implication – Rules of Inference; The Use of Quantifiers, Quantifiers, Definitions and the Proofs of Theorems

UNIT – III  [10 Hours]

UNIT – IV  [10 Hours]

UNIT – V  [10 Hours]

Reference
1. Write a C Program to demonstrate all the operators.
2. Write a C Program for electricity bill tacking different Categories of users, different slabs in each category.
3. Write a C Program to find check whether the given number is Prime or not.
4. Write a menu driven C Program to find the factorial of number (a) Without function (b) Using non-recursive function (c) Using Recursive Function.
5. Write a C Program to check the correctness of the date and compare two dates.
6. Write a C Program to find the sum of its individual digits repeatedly till the result is a single digit.
7. Write a program to enter integer number and find the largest and smallest digit of the number.
8. Write a program to read three digits +ve integer number 'n' and generate possible permutations of number using their digits.
9. Write a C Program to accept a text upto 50 words and perform following actions
   a) Count total vowels, constants, spaces, sentences and words with spaces.
   b) Program should erase more than one space between two successive words.
10. Write a C program to enter names of cities and display all the entered names alphabetically.
11. Write menu Driven C Program to calculate to calculate sin, cos and exponential series without using standard library function.
12. Write a C Program to accept array of elements in unsorted order, sort the array and search an element using binary search.
13. Write a C Program to add and multiply two matrices.
14. Write a C Program to display list of C program files and directories.
15. Write a program to use macros as an array and pointer.
16. Write a program to display the attributes of a file using dos interrupt.
17. Write a program to delete a file using dos interrupt.
18. Create user defined data type equivalent to int. Declare three variables of its type. Perform arithmetic operations using these variables.
19. Write a program to read a C program file and count the following in the complete program. a) Total number of statements b) Total number of included files c) Total number of brackets.
20. Write a program to display C Program files in current directory. The user should select one of the files. Convert the file contents in Capital and Display the same on the screen.
21. Write a program to interchange the contents of two files.
22. Write a program to change mouse cursor.
1. Accounting software, introduction and installation.
2. Creation of accounts in the name of the trading and non-trading organisations, including alteration and deletion.
3. Creation of accounting groups and ledgers, using single and multiple options.
4. Creation of inventory groups and ledgers.
5. Vouchers, types and vouchers entry.
6. Creation of various accounting Ledgers.
7. Recording of various accounting transactions.
8. Inventory: classification and grouping using single and multiple options.
9. Recording of inventory information.
10. Purchase order and sales order processing.
11. Correction of ledgers and vouchers using alter option.
13. Displaying Income statement and balance sheet under different options and time periods.
15. Printing of ledgers, invoice, cheques and statements.
16. Creation of pay roll records.
17. Recording of Pay roll information and salary statement.
18. Generating statutory reports.
19. Working with different accounting periods.
20. File import and export process.
21. Data protection and safeguard.
22. Practical training on preparation of computerised accounting for computer hardware stores.
23. Practical training on preparation of computerised accounting for a software development company.
25. Practical session on audit under computerised accounting environment.
26. Practical session on audit under computerised accounting environment.
SECOND SEMESTER MCA
MCA201T: DATA STRUCTURES
Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT – I [12 Hours]

UNIT – II [10 Hours]
Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory, Traversing Linear arrays, Inserting and deleting, Sorting: Bubble sort, Insertion sort, Selection sort, Merge Sort, Quick Sort Searching: Linear Search, Binary search, Multidimensional arrays, Matrices and Sparse matrices.

UNIT - III [10 Hours]
Linked list: Definition, Representation of Singly linked list in memory, Traversing a Singly linked list, Searching a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly liked list; Doubly liked list, Header liked list, Circular linked list.

UNIT – IV [10 Hours]

UNIT - V [10 Hours]
Graphs: Graph theory terminology, Sequential representation of Graphs: Adjacency matrix, traversing a Graph. Tree – Definitions, Binary trees, Representing binary trees in memory, Traversing Binary Trees, Binary Search Trees, Searching, Inserting and Deleting in a Binary Search Tree, Heap, Heap Sort.

Reference
MCA202T: DATA BASE MANAGEMENT SYSTEMS

Total Teaching Hours: 52
No. of Hours / Week: 04

UNIT – I
[12 Hours]
Introduction: Database and Database Users, Characteristics of the Database Approach, Different people behind DBMS, Implications of Database Approach, Advantages of using DBMS, When not to use a DBMS. Database System Concepts and architecture: Data Models, Schemas, and Instances. DBMS Architecture and Data Independence., Database languages and interfaces. The database system Environment, Classification of DBMS.

UNIT - II
[10 Hours]

UNIT - III
[10 Hours]

UNIT – IV
[10 Hours]
Relational Database Language: Data definition in SQL, Queries in SQL, Insert, Delete and Update Statements in SQL, Views in SQL, Specifying General Constraints as Assertions, specifying indexes, Embedded SQL. PL/SQL: Introduction.

UNIT - V
[10 Hours]

Reference
MCA203T: COMPUTER NETWORKS
Total Teaching Hours: 52  No. of Hours / Week: 04

UNIT - I  [12 Hours]
Introduction: Growth of computer networking, Complexity in network system, Motivation and Tools: Resource sharing, Growth of the internet, probing the internet, interpreting the ping response, tracing a route. Transmission Media: Copper wires, glass fibers, radio, satellite, Geosynchronous satellites, low earth orbit satellites, Low earth orbit satellite arrays, Microwave, Infrared, Light from a laser. Local Asynchronous Communications: Introduction, the need for asynchronous communications, using electric current to send bits, standards for communication, baud rate, Framing and errors, Half and Full duplex asynchronous communication, the effect of noise on communication.
Long distance Communication: Sending signals across long distances, Modem hardware used for Modulations and Demodulation, Leased analog data circuits, optical, radio frequency and dialup Modems, carrier frequencies and Multiplexing, baseband and broadband technologies, wave length division multiplexing, spread spectrum, time division multiplexing.

UNIT - II  [10 Hours]
Packets, Frames and Error Detection: Concept of Packets, packets and Time-division Multiplexing, Packets and Hardware Frames, byte Stuffing, transmission errors, Parity bits and Parity checking, error detection, Detecting errors with checksums, detecting errors with CRC, Burst errors, frame formats and error detection mechanism. LAN Technologies and Network Topologies: Direct point-to-point communications, Shared Communications channels, LAN Topologies, Ethernet, Carries sense on CSMA, Collision Detection and Back off with CSMA/CD, Ring Topology and Token Passing, Self-Healing Token Passing Networks, ATM. Hardware addressing and Frame Type Identification: specifying a recipient, How LAN hardware uses addresses to filter packets, format of a physical addresses, broadcasting, Multicast addressing, identifying packet contents, frame headers and frame format.

UNIT - III  [10 Hours]
LAN Wiring, Physical Topology and Interface Hardware: speeds of LANs and computers, Network Interface Hardware, The connection between a NIC and a network, original thick Ethernet wiring, connection multiplexing, thin Ethernet wiring, twisted pair Ethernet, Network interface cards and wiring schemes, categories of wires. Extending LANs: Fiber Optic Extensions, Repeaters, bridges, frame filtering, switching, Long-distance and Local Loop Digital Technologies: Digital telephony, Synchronous communication, SONET, ISDN, Asymmetric Digital Subscriber Line Technology, other DSL technologies, cable modem technology, upstream communication, Broadcast Satellite systems.

UNIT - IV  [10 Hours]
UNIT - V
Internetworking: internet architecture, A virtual Network, Layering and TCP/IP protocols. Internet Protocol Addresses, APR, IP Datagram’s and Datagram Forwarding, IP Encapsulation, Fragmentation, and Reassembly, IPv6, ICMP, UDP, TCP, Internet routing, DNS, WWW, MAIL.

Reference
MCA204T: OPERATING SYSTEMS

Total Teaching Hours: 52
No. of Hours / Week: 04

UNIT – I [12 Hours]

UNIT – II [10 Hours]
Process Synchronization and deadlocks: The Critical Section Problem, Synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, monitors, Dead locks – system model, Characterization, Dead lock prevention, avoidance and detection, Recovery from dead lock, Combined approach to deadlock handling.

UNIT – III [10 Hours]
Memory Management: Logical and Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, Segmentation with paging in Mastics and Intel 386, Virtual memory-Demand paging and it’s performance, Page replacement algorithms, Allocation of frames, thrashing, page size and other considerations. Demand Segmentation.

UNIT – IV [10 Hours]

UNIT – V [10 Hours]
Case Study of Windows and Linux Operating System

Reference
MCA205P: DATA STRUCTURES LAB

1. Write a menu driven program to implement linear and binary search also find the location of its first occurrence
2. Write a menu driven program to sort the array in ascending/descending order using
   a) Quick sort   b) Merge sort
3. Write a menu driven program to create a linked list and to perform insert and delete operations
4. Write a program to add two polynomials using a linked list/
5. Write a menu driven program to perform insert and delete operations in a circular linked list.
6. Write a menu driven program to perform operations on a stack (linked list implementation)
7. Write a menu driven recursive program to a) find factorial of a given number
   b) generate first N terms of a fibonacci sequence   c) GCD of three numbers.
8. Write a program to solve the problem of towers of hanoi with 3 pegs and N discs.
9. Write a menu driven program to perform operations on a circular queue (linked list implementation).
10. Write a menu driven program to a) find the length of a string b) concatenate two strings c) to extract a substring from a given string d) finding and replacing a string by another string in a text (Use pointers and user-defined functions)
11. Write a program to convert the given infix expression into its postfix form.
12. Write a program to evaluate the given postfix expression with a set of values.
13. Write a menu driven program to create binary tree and to perform insert and delete operations.
14. Write a menu driven program to create a binary search tree and to perform inorder, preorder and postorder traversals
15. Write a program sort the array of N elements using Heap Sort.
MCA206P: DATA BASE MANAGEMENT SYSTEMS LAB

1. Database Customization
2. Creating Databases/Table spaces
3. Create Objects
4. Moving Data
5. Recovery
6. Locking
7. Preparing Applications for Execution using a front end tool
8. Application Performance Tool

The students are supposed to practice and develop a mini application for above mentioned lab. The students can do the activity in a group (team) consisting of not more than 2 students.

The entire application to be submitted by each team should be done with all the above activities. The examiner may ask to perform any of the above acts.
THIRD SEMESTER MCA

MCA301T: FILE STRUCTURES

Total Teaching Hours: 52
No. of Hours / Week: 04

UNIT – I

UNIT – II
Organization of Files for Performance, Indexing: Data Compression, Reclaiming Space in files, Internal Sorting and Binary Searching, Key sorting; Index: Introduction, A Simple Index for Entry- Sequenced File, Object-Oriented support for Indexed, Entry-Sequenced Files of Data Objects, Indexes that are too large to hold in Memory, Indexing to provide access by Multiple keys, Retrieval Using Combinations of Secondary Keys. Consequential Processing and The Sorting of Large Files: A Model for Implementing Consequential Processes, Application of the Model to a General Ledger Program, Extension of the Model to include Multi-way Merging, A Second Look at Sorting in Memory, Merging as a Way of Sorting Large Files on Disk.

UNIT – III
Multilevel indexing and B-Trees: The invention of B-Tree, Statement of the problem, Indexing with Binary Search Trees; Multi-Level Indexing, B-Trees, Example of Creating a B-Tree, An Object-Oriented Representation of B-Trees, B-Tree Methods; Nomenclature, Formal Definition of B-Tree Properties, Worst-case Search Depth, Deletion, Merging and Redistribution, Redistribution during insertion; B* Trees.

UNIT – IV

UNIT – V
Reference

UNIT – I  

UNIT – II  

UNIT – III  
Class Modeling and Design Approaches: Three approaches for identifying classes - using Noun phrases, Abstraction, Use Case Diagram - Comparison of approaches - Using combination of approaches - Flexibility guidelines for class diagram: Cohesion, Coupling, Forms of coupling (identity, representational, subclass, inheritance), class Generalization, class specialization versus aggregation. Behavioral (Dynamic structural view): State diagram - State Diagram Notations, events (signal events, change events, Time events) - State Diagram states (composite states, parallel states, History states), transition and condition, state diagram behaviour (activity effect, do-activity, entry and exit activity), completion transition, sending signals.

UNIT – IV  
Interaction diagrams: Sequence diagram - Sequence diagram notations and examples, iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links, Activations in sequence diagram - Collaboration diagram - Collaboration diagram notations and examples, iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links, activations in sequence diagram. Approaches for developing dynamic systems: Top - down approach for dynamic systems - Bottom - up approach for dynamic systems - Flexibility Guidelines for Behavioral Design - guidelines for allocating and designing behaviors that lead to more flexible design.
UNIT – V

[10 Hours]

Architectural view: Logical architecture: dependency, class visibility, sub systems -

Hardware architecture: deployment diagram notations, nodes, object migration between

node - Process architecture: what are process and threads and their notations in UML,

object synchronization, invocation schemes for threads (UML notations for different
types of invocations). Implementation architecture: component diagram notations and
examples. Reuse: Libraries, Frame works components and Patterns: Reuse of classes,

Reuse of components, Reuse of frameworks, black box framework, white box frame,

Reuse of patterns: Architectural pattern and Design pattern.

Reference

1. Charles Richter, “Designing Flexible Object Oriented systems with UML”,
Macmillan Technical, 1999

Technology, 2004

3. James Rumbaugh, Micheal Blaha, Object oriented Modeling and Design with


MCA303T: THEORY OF COMPUTATION

Total Teaching Hours: 52
No. of Hours / Week: 04

UNIT – I [12 Hours]
Review of Mathematical Terms and Theory: Basic Mathematical Notations and Set Theory, Logic Functions and Relations, Language Definitions, Mathematical Inductions and Recursive Definitions. Finite Automata: Deterministic and Non Deterministic Finite Automata, U-Transitions, Conversion from NFA to DGA, Kleene’s Theorem, Regular and Non Regular Languages.

UNIT – II [10 Hours]
Context Free Grammar: Introduction to CFG, CFG and Known Languages, Unions, Concatenations and ‘*’s Notations and CFL, Derivatives of Trees and Ambiguity and Unambiguous CFG and Algebraic Expressions, Normal Forms and Simplified Forms. Pushdown Automata, CFL and NFL: Introduction to PDA, Definition, DPDA, PDA Corresponding to CFG, CFG Corresponding to PDA, Introduction to CFL, Intersections and Complements of CFL, Decisions Problems and CFL.

UNIT – III [10 Hours]

UNIT – IV [10 Hours]
Computation Functions, Measuring, Classifications And Complexity: Primitive Recursive Functions, Halting Problem, Recursive Predicates and Some Bounded Operations, Unbounded Minimizations and \( \mu \)-Recursive Functions, Godel Numbering, Computable Functions and \( \mu \)-Recursive, Numerical Functions.

UNIT – V [10 Hours]
Tractable and Intractable Problems: Growth Rate and Functions, Time and Speed Complexity, Complexity Classes, Tractable and Possibly Intractable Problems, P and NP Completeness, Reduction of Time, Cook’s Theorem, NP-Complete Problems.

Reference
MCA304T: STATISTICAL ANALYSIS

Total Teaching Hours: 52  
No. of Hours / Week: 04

UNIT – I  
[12 Hours]
Sample spaces - events - Axiomatic approach to probability - conditional probability - Independent events - Baye's formula - Random Variables - Continuous and Discrete random variables - distribution function of a random variables - Characteristic of distributions - Expectation, variance - coefficient of variation, moment generation function - Chebyshev's inequality

UNIT – II  
[10 Hours]
Bivariate distribution - conditional and marginal distributions - Discrete distributions - discrete uniform, Binomial poison and geometric Distributions - Continuous distributions - Uniform, Normal, Exponential and Gamma distributions.

UNIT – III  
[10 Hours]
Correlation coefficient - Rank correlation coefficient of determination - Linear Regression - Method of Least squares - Fitting of the curve of the form ax + b, ax^2 + bx + c, ab^x and ax^b - multiple and partial correlation (3 - variables only).

UNIT – IV  
[10 Hours]
Concept of sampling – Methods of sampling - simple random sampling - Systematic sampling and stratified random sampling (descriptions only) - concepts of sampling distributions and standard error - point estimation (concepts only) - Interval Estimation of mean and proportion. Tests of Hypotheses - Critical Region - two types of Errors - Level of significance - power of the test - Large sample tests for mean and proportion - Exact tests based on Normal, t, F and Chi-square distributions.

UNIT – V  
[10 Hours]
Basic principles of experimentation - Analysis of variance - one way and two way classifications - computing randomized design - Randomized Block design - Time series Analysis - Measurement of Trend and Seasonal variations.

Reference
MCA305P: ADVANCED DATA STRUCTURES LAB

1. Write a C++ Program to read series of names, one per line, from standard input and write these names spelled in reverse order to the standard output using I/O redirection and pipes. Repeat the exercise using an input file specified by the user instead of the standard input and using an output file specified by the user instead of the standard output.

2. Write a C++ program to read and write student object with fixed length records and the fields delimited by “|”. Implement pack(), unpack(), modify(), and search() methods.

3. Write a C++ program to read and write student objects with Variable-Length records using any suitable record structure. Implement pack(), unpack(), modify(), and search() methods.

4. Write a C++ program to read and write student objects with Variable-Length records using any suitable record structure and to read from this file a student record using RRN.

5. Write a C++ program to implement simple index on primary key for a file of student objects. Implement add(), search(), delete() using the index.

6. Write a C++ program to implement index on secondary key, the name, for a file of student objects. Implement add(), search(), delete() using the secondary index.

7. Write a C++ program to read two lists of names and then match the names in the two lists using sequential Match based on a single loop. Output the names common to both the lists.

8. Write a C++ program to read k Lists of names and merge them using k-way merge algorithm with k = 8.

9. Write a C++ program to implement B-Tree for a given set of integers and its operations insert() and search(). Display the tree.

10. Write a C++ program to implement B+ Tree for a given set of integers and its operations insert() and search(). Display the tree.

11. Write a C++ program to store and retrieve student data from file using hashing. Use any collision resolution techniques.

12. Write a C++ program to reclaim the free space resulting from the deletion of records using liked list.
1. The student should take up the case study of Unified Library application which is mentioned in the theory, and Model it in different views i.e. Use case view, logical view, component view, Deployment view, Database design, forward and Reverse Engineering, and Generation of documentation of the project.

2. Student has to take up another case study of his/her own interest and do the same whatever mentioned in first problem. Some of the ideas regarding case studies are given in reference books, which were mentioned in theory syllabus, can be referred for some idea.
MCA307T (Soft Core): QUANTITATIVE, TEACHING AND RESEARCH
APTITUDE

Total Teaching Hours: 48
No. of Hours / Week: 03

UNIT – I
[8 Hours]
Numbers Property – Simplification – Divisibility – HCF and LCM – Decimal Fractions –
Square roots and Cube Roots – Logarithms – Anti-logarithms - Surds and indices -
Permutation and Combination – Probability – Odd man out series - Number series - letter

UNIT – II
[10 Hours]
Time and work – Problems on Ages – Calendar – Clock – Pipes and Cistern – Time and
Distance – Problems of Train – Boats and Streams. Area – Volume and surface Areas –
Heights and Distances – Data Interpretation: Tabulation – Bar Graphs – Pie Charts –
Line Graphs. Data Interpretation - Sources, acquisition and interpretation of data; Quantitative and qualitative data; Graphical representation and mapping of data.

UNIT – III
[10 Hours]
Simple Interest – Compound Interest – Stocks and Shares – True Discount – Banker’s
discount. Averages – Percentage – Profit and Loss - Ratio and Proposition – Partnership –
Allegation and mixture – Chain rule. Understanding the structure of arguments; Evaluating and distinguishing deductive and inductive reasoning; Verbal analogies: Word
analogy Applied analogy; Verbal classification; Reasoning Logical Diagrams: Simple
diagrammatic relationship, multidiaigrammatic relationship; Venn diagram; Analytical
Reasoning.

UNIT – IV
[10 Hours]
Teaching: Nature, objectives, characteristics and basic requirements; Learner's
characteristics; Factors affecting teaching; Methods of teaching; Teaching aids; Evaluation systems. Research Aptitude: Meaning, characteristics and types; Steps of research; Methods of research; Research Ethics; Paper, article, workshop, seminar, conference and symposium; Thesis writing: its characteristics and format. Reading
Comprehension: A passage to be set with questions to be answered. Communication:
Nature, characteristics, types, barriers and effective classroom communication.

UNIT – V
[10 Hours]
Higher Education System: Governance, Polity and Administration; Structure of the
institutions for higher learning and research in India; formal and distance education;
professional/technical and general education; value education: governance, polity and
administration; concept, institutions

Reference
2. Govind Prasad Singh and Rakesh Kumar, Text Book of Quickest Mathematics (for all
Competitive Examinations), Kiran Prakashan, 2012.
4. Dr. Lal, Jain, Dr. K. C. Vashistha, “U.G.C.- NET/JRF/SET Teaching & Research
FOURTH SEMESTER
MCA401T: ADVANCED JAVA PROGRAMMING

Total Teaching Hours: 52
No. of Hours / Week: 04

UNIT – I
[12 Hours]
Introduction: Data Types, Operators, Classes, Inheritance, Packages and Interfaces. Exception Handling, Concurrency and Multithreaded programming, Enumerations, Autoboxing, Annotations, I/O, Generics, String handling

UNIT – II
[10 Hours]
JVM: Java Class file, Class Loader, Linking model, Garbage collection, Type conversion, Floating Point Arithmetic, Method Invocation and Return, Thread synchronization. Java I/O: Closeable, Flushable Interfaces, The Stream classes, Bytes Streams, Character Streams, Console Class, Serialization. Java Networking - Networking Classes and Interfaces, TCP/IP Sockets, Datagrams

UNIT – III
[10 Hours]

UNIT – IV
[10 Hours]
Java Design patterns: Singleton, Observer, Adaptor, Proxy, Decorator, Factory, AbstractFactory, Facade, Command, Template Method patterns, MVC.

UNIT – V
[10 Hours]
Spring and Hibernate framework, Spring Flow, Hibernate Flow.

Reference
MCA402T: ADVANCED ALGORITHMS

Total Teaching Hours: 52

UNIT - I [12 Hours]

UNIT-II [10 Hours]
Graph Algorithms: Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson’s Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method; Maximum bipartite matching.

UNIT-III [10 Hours]
Polynomials and the FFT: Representation of polynomials; The DFT and FFT; Efficient implementation of FFT. Number -Theoretic Algorithms: Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem; Powers of an element; RSA cryptosystem; Primality testing; Integer factorization.

UNIT-IV [10 Hours]

UNIT-V [10 Hours]

Reference
MCA403T: ADVANCED SOFTWARE ENGINEERING

Total Teaching Hours: 52
No. of Hours / Week: 04

UNIT - I [12 Hours]
Agile development: Agile, Agility and cost of change; Agile Process, Extreme programming; Other agile process models. Web Application Design: Web application design quality; Design quality and design pyramid; Interface design; Aesthetic design; Content design; Architecture design; Navigation design; Component-level design; Object-oriented hypermedia design method.

UNIT - II [10 Hours]
Formal Modeling and verification: The cleanroom strategy; Functional specification; Cleanroom design; Cleanroom testing; Formal methods: Concepts; Applying mathematical notation for formal specification; Formal specification languages. Software Project Management: The management spectrum; The management of people, product, process and project; The W5HH Principle; Critical practices. Estimation for Software Projects: Software project estimation; Decomposition techniques, Examples; Empirical estimation models; Estimation for Object-Oriented projects; Specialized estimation techniques; The make / buy decision.

UNIT - III [10 Hours]
Software Project Scheduling: Basic concepts and principles of project scheduling; Defining task set and task network; Scheduling; Earned value analysis. Risk Management: Reactive versus proactive strategies; Software risks; risk identification; Risk projection; Risk refinement; Risk mitigation, monitoring and management; The RMMM plan. Maintenance and Reengineering: Software maintenance; Software supportability; Reengineering; Business process reengineering; Software reengineering; Reverse engineering; Restructuring; Forward engineering; The economics of reengineering.

UNIT - IV [10 Hours]
Software Process Improvement (SPI): Approaches to SPI; Maturity models; The SPI process; The CMMI; The People CMM; Other SPI frameworks: SPICE, Bootstrap, PSP and TSP, ISO; SPI return on investment.

UNIT - V [10 Hours]
Software Configuration Management (SCM): Basic concepts; SCM repository; The SCM process; Configuration management for web applications; SCM standards. Product Metrics: A framework for product metrics; Metrics for requirements model, design model, source code, testing and maintenance; Design metrics for web applications. Process and Project Metrics: Basic concepts; Software measurement; Metrics for software quality; Integrating metrics within the software process; Metrics for small organizations; Establishing a software metrics program.

Reference
MCA404T: QUANTITAVE TECHNIQUES

Total Teaching Hours: 52  
No. of Hours / Week: 04

UNIT - I  
[12 Hours]

UNIT - II  
[10 Hours]

UNIT - III  
[10 Hours]

UNIT - IV  
[10 Hours]

UNIT - V  
[10 Hours]
Queuing System: Elements of Queuing model, Pure birth and death models, Generalized Poission Queuing model, specialized poission. Queues: Steady-state Measure of performance, single sever models, Multiple server models, Matching serving model.

Reference

5. P.N Guptha & Gandhi “ Quantitative Techniques” , University Science Proess 2011
MCA405P: ADVANCED JAVA PROGRAMMING LAB

1. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result.

2. Write a Java program that creates three threads. First thread displays “Good Morning” every one second, the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.

3. Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time. No light is on when the program starts.

4. Write a Java Program to execute select query using JDBC

5. Write a Java Program to Create Thread using Interface and class.

6. Write a Java Program to Implement Producer and Consumer problem using Threads.

7. Write a Java Program to Implement DOM parser.

8. Write a Java Program to Implement SAX parser.

9. Write a Java Program to Implement Singleton design pattern using java.

10. Write a Java Program to Implement Factory and AbstractFactory design pattern using java.

11. Write a Java Program to Implement Observer Design pattern method using java.

12. Write a Java Program to Implement Adapter design pattern using java.

13. Write a Java Program to Implement proxy design pattern using java.

14. Write a Java Program to Implement HelloWorld program using servlets.

15. Write a JSP Program using Expression, Scriplet and Directive.
MCA406P: ADVANCED ALGORITHMS

1. Program to implement Bellman Ford algorithm.
2. Program to implement Johnson algorithm.
3. Program to implement Ford-Fulkerson method
4. Program to solve Linear modular equation
5. Program to implement Rabin - Karp algorithm
6. Program to implement Knuth-Morris-Pratt algorithm
7. Program to implement Boyer – Moore algorithms.
8. Program to solve traveling-sales-person problem
9. Program to solve set covering problem
10. Program to solve Sum of subset problem.
MCA407T: SOFT SKILLS AND PERSONALITY DEVELOPMENT
Total Teaching Hours: 48 No. of Hours / Week: 03

UNIT – I [10 Hours]

UNIT - II [10 Hours]
Meaning and definition of personality, Personal Planning and Success Attitude: Prioritizing, Creating the master plan, Active positive visualization and Spot analysis. Self-Motivation and Communication: Levels of motivation, power of irresistible enthusiasm, etiquettes and manners in a group, public speaking, Importance of listening and responding.

UNIT - III [10 Hours]
Motivation Skills & Personality Development, Goal Setting, Career Planning, Resume Building, Psychometric Test, Priority Management & Time Management, Positive Attitude and Self Confidence. Verbal Communication includes Planning, Preparation Delivery, Feedback and assessment of activities like: Public speaking, Group Discussion, Oral Presentation skills, Perfect Interview, Listening and observation skills, body language and use of Presentation aids.

UNIT - IV [8 Hours]
Written communication that includes project proposals, brochures, newsletters, articles. Etiquettes that include: etiquettes in social as well as office settings, email etiquettes, telephone etiquettes. Improving Personal Memory, study skills that include rapid reading, notes taking and creativity.

UNIT - V [10 Hours]
Problem Solving and Decision Making Skills, Perceptive, Conceptual, Creative, Analytical and Decisive. Leadership as a process: co-ordination while working in a team, Leadership styles, Leader and Team player, Management of conflict, Profiles of great and successful personalities, Role of career planning in personality development, negotiation, Motivating.

Reference
FIFTH SEMESTER
MCA501T: ADVANCED WEB PROGRAMMING

Total Teaching Hours: 52  No. of Hours / Week: 04

UNIT – I  [12 Hours]
Perl, CGI Programming: Origins and uses of Perl; Scalars and their operations; Assignment statements and simple input and output; Control statements; Fundamentals of arrays; Hashes; References; Functions; Pattern matching; File input and output; Examples. The Common Gateway Interface; CGI linkage; Query string format; CGI.pm module; A survey example; Cookies.

UNIT – II  [10 Hours]
Servlets and Java Server Pages: Overview of Servlets; Servlet details; A survey example; Storing information on Clients; Java Server Pages. PHP: Origins and uses of PHP; Overview of PHP; General syntactic characteristics; Primitives, operations and expressions; Output; Control statements; Arrays; Functions; Pattern matching; Form handling; Files; Cookies; Session tracking.

UNIT – III  [10 Hours]
Database Access through the Web: Relational Databases; An introduction to SQL; Architectures for Database access; The MySQL Database system; Database access with PERL and MySQL; Database access with PHP and MySQL; Database access with JDBC and MySQL.

UNIT – IV  [10 Hours]
Introduction to Ruby, Rails: Origins and uses of Ruby; Scalar types and their operations; Simple input and output; Control statements; Fundamentals of arrays; Hashes; Methods; Classes; Code blocks and iterators; Pattern matching. Overview of Rails; Document requests; Processing forms; Rails applications with Databases; Layouts.

UNIT – V  [10 Hours]
Introduction to Ajax: Overview of Ajax; The basics of Ajax; Rails with Ajax.

Reference
MCA502T: ADVANCED DATABASE MANAGEMENT SYSTEMS

Total Teaching Hours: 52
No. of Hours / Week: 04

UNIT – I [12 Hours]

UNIT – II [10 Hours]

UNIT – III [10 Hours]
Data Warehousing and Data Mining: Data Warehouse Architecture, Data Warehouse Implementation, Mining Methods, Mining Various Kinds of Association Rules. Data Mining: Data Mining Applications, Social Network Analysis;

UNIT – IV [10 Hours]
Big Data: Introduction to principles and practice of systems that improve performance through experience. Topics include statistical learning framework, supervised and unsupervised learning, performance evaluation and empirical methodology; design tradeoffs. Introduction to the Big Data problem. Current challenges, trends, and applications Algorithms for Big Data analysis. Mining and learning algorithms that have been developed specifically to deal with large datasets Technologies for Big Data management. Big Data technology and tools, special consideration made to the Map-Reduce paradigm and the Hadoop ecosystem.

UNIT - V [10 Hours]
Reference

5. Jiawei Han and Micheline Kamber, Data Mining, Concepts and Techniques, Morgan Kaufmann Publisher, II Edition, 2006.
MCA503T: ARTIFICIAL INTELLIGENCE

Total Teaching Hours: 52  No. of Hours / Week: 04

UNIT-I  [12 Hours]
Introduction to Artificial Intelligence: Definition, AI Applications, AI representation, Properties of internal Representation, Heuristic search techniques. Best first search, mean and end analysis, A* and AO* Algorithm, Game Playing, Minimize search procedure, Alpha beta cutoffs, waiting for Quiscence, Secondary search.

UNIT-II  [10 Hours]
Knowledge representation using predicate logic: predicate calculus, Predicate and arguments, ISA hierarchy, frame notation, resolution, Natural deduction. Knowledge representation using non monotonic logic: TMS (Truth maintenance system), statistical and probabilistic reasoning, fuzzy logic, structure knowledge representation, semantic net, Frames, Script, Conceptual dependency.

UNIT-III  [10 Hours]

UNIT-IV  [10 Hours]

UNIT-V  [10 Hours]
Natural language processing and understanding and pragmatic, syntactic, semantic, analysis, RTN, ATN, understanding sentences. Expert system: Utilization and functionality, architecture of expert system, knowledge representation, two case studies on expert systems.

Reference
MCA505P: ADVANCED WEB PROGRAMMING LAB

1. Develop and demonstrate a XHTML file that includes Javascript script to generate first n Fibonacci numbers.
2. Develop and demonstrate the usage of inline and external style sheet using CSS
3. Develop and demonstrate, using Javascript script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.
4. Develop and demonstrate, using Javascript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.
5. Design an XML document to store information about a student in a college affiliated to BU. The information must include USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
6. Write a Perl program to display a digital clock which displays the current time of the server.
7. Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.
8. Write a PHP program to store current date-time in a COOKIE and display the ‘Last visited on’ date-time on the web page upon reopening of the same page.
9. Write a PHP program to read student data from an XML file and store into the MYSQL database. Retrieve and display.
10. Write a Perl program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.
11. Write a CGI-Perl program to use a cookie to remember the day of the last login from a user and display it when run.
12. Write a Perl program to display various Server informations like Server Name, Server Software, Server protocol, CGI Revision etc.
13. Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name.
14. Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.
MCA506P: MINI PROJECT

The students are supposed to develop a mini – project for above mentioned lab. The students can do the project in a group (team) consisting of not more than 2 students. A project report must be submitted by each team.
SIXTH SEMESTER
ELECTIVES
MCA6E1: DISTRIBUTED OPERATING SYSTEMS
Total Teaching Hours: 52  No. of Hours / Week: 04

UNIT – I  [12 Hours]

UNIT – II  [10 Hours]
Remote Procedure Calls: Introduction, The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC, Optimization for Better Performance, Case Studies: Sun RPC.

UNIT – III  [10 Hours]

UNIT – IV  [10 Hours]

UNIT – V  [10 Hours]

Reference
MCA6E2: SOFTWARE TESTING

Total Teaching Hours: 52
No. of Hours / Week: 04

UNIT – I
[12 Hours]

UNIT – II
[10 Hours]

UNIT – III
[10 Hours]

UNIT – IV
[10 Hours]

UNIT – V
[10 Hours]
Model-Based Testing: Testing based on models, Appropriate models, Use case-based testing, Commercial tool support for model-based testing. Test-Driven Development: Test-then-code cycles, Automated test execution, Java and JUnit example, Remaining questions, Pros, cons, and open questions of TDD, Retrospective on MDD versus TDD. A Closer Look at All Pairs Testing: The all-pairs technique, A closer look at NIST study, Appropriate applications for all pairs testing, Recommendations for all pairs testing. Software Testing Excellence: Craftsmanship, Best practice of software
testing, Top 10 best practices for software testing excellence, Mapping best practices to diverse projects.

Reference

MCA6E3: PARALLEL ALGORITHMS
Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT- I [12 Hours]

UNIT - II [10 Hours]

UNIT- III [10 Hours]
ALGEBRAIC PROBLEMS: Generating Permutations and Combinations in Parallel – Matrix Transpositions – Matrix by Matrix Multiplications – Matrix by Vector multiplication.

UNIT- IV [10 Hours]

UNIT - V [10 Hours]
DECISION AND OPTIMIZATION PROBLEMS: Computing Prefix Sums – Applications - Job Sequencing with Deadlines – Knapsack Problem- The Bit Complexity of Parallel Computations.

Reference
MCA6E4: COMPILER DESIGN

Total Teaching Hours: 52  No. of Hours / Week: 04

UNIT-I  [10 Hours]
Introduction to compiler- Complier and Translators-Phases of Compilation-One pass compiler, Lexical Analysis-Role of Lexical Analyzer-Regular expressions-Finite Automata-Design of lexical Analyzer- Context free grammars- Parse trees.

UNIT-II  [07 Hours]

UNIT-III  [10 Hours]
Syntax directed translation-Construction of syntax trees-Evaluation of S attributed and L attributed definitions-Top down Translation-Recursive evaluators, Type checking-Simple type checker-Type conversions- Overloading of functions and operators-Polymorphic functions, Run time environment –Source language issues-Storage organization-Storage Allocation-symbol tables-Dynamic storage allocation techniques.

UNIT-IV  [15 Hours]

UNIT-V  [10 Hours]
Approaches to compiler development- Complier environment- Testing and Maintenance Compiler for Pascal-Complier for C.

Reference:


**UNIT-I**

Introduction: What are multimedia, multimedia application, Goal and objectives, Multimedia building blocks, multimedia and internet.

**UNIT-II**

Multimedia Configuration: Multimedia PC workstation components, multimedia platform, multimedia development tool, authoring tool, Interactivity, High end multimedia architectures. MULTIMEDIA OPERATING SYSTEM File system (File format: TIEF, BMP, PCX, GIF etc.) Process management, multimedia communication system, multimedia database management system. Multimedia Audio: Basic sound concepts, audio capture, music, speech sound processor, sound recovery technique, VOC4WAV file formats for sound.

**UNIT-III**

Multimedia graphics: 2D/3D animation fundamentals, color modules DIGITAL IMAGING: still and moving images; video capture animation video, Processing, video Recovery techniques, AVO, AVI file formats, NTSC, PAL, SECAM, HDTV, system video/audio conferencing techniques and standards, video streaming, motion of synchronization.

**UNIT-IV**

Image Compression techniques: LZW, DCT run length coding, JPEG, MPEG, standard hypertext MHEG, Hypertext and Hypermedia, document architecture ODA, MHEG. Augmented and virtual reality and multimedia: Concept, VR devices: hand Gloves, head mounted tracking system, V R Chair, CCD, VCR ,3D, sound system, Head Mounted Displays and rendering software setup, Virtual objects, VRML.

**UNIT-V**


**Reference**

3. Durano R Begault, Virtual Reality and Multimedia, AP Professionals. 2003
4. Micheal J Young, Windows multimedia and animation with C++ programming for Win95, AP Professional. 2004
MCA6E6: E-GOVERNANCE

Total Teaching Hours: 52  No. of Hours / Week: 04

UNIT – I  [12 Hours]

UNIT – II  [10 Hours]
National e-Governance Plan, Government of India guidelines for websites, W3C guidelines, web 2.0, web 3.0

UNIT – III  [10 Hours]

UNIT – IV  [10 Hours]
Workflow Management in e-Governance, Digital Divide, Mechanism to handle Digital Divide, Bridge the digital divide, M-Governance, e-Learning, Role of Social Media in e-Governance, Big data Analytics in e-Governance, Semantic web Analytics.

UNIT – V  [10 Hours]

Reference

10. UN Survey on e-Governmen, 2014 (or latest).
   https://publicadministration.un.org/egovkb/portals/egovkb/documents/un/2014-
survey/e-gov_complete_survey-2014.pdf
delivery-of-financial-and-other-subsidies-benefits-and-services-bill-2016-4202/
MCA6E7: DIGITAL IMAGE PROCESSING

Total Teaching Hours: 52  No. of Hours / Week: 04

UNIT-I [12 Hours]

UNIT - II [10 Hours]

UNIT - III [10 Hours]

UNIT- IV [10 Hours]
IMAGE SEGMENTATION: Edge detection, Edge linking via Hough transform, Thresholding, Region based segmentation, Region growing, Region splitting and Merging, Segmentation by morphological watersheds, Basic Concepts, Dam Construction, Watershed segmentation algorithm.

UNIT- V [10 Hours]
IMAGE COMPRESSION: Need for data compression, Fundamentals – Image compression models Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

Reference
MCA6E8: MOBILE COMPUTING

Total Teaching Hours: 52  No. of Hours / Week: 04

UNIT – I  [12 Hours]
Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

UNIT -II  [10 Hours]

UNIT – III  [10 Hours]
Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

UNIT– IV  [10 Hours]
Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

UNIT– V  [10 Hours]
Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Reference
MCA6E9: TCP/IP

Total Teaching Hours: 52
No. of Hours / Week: 04

UNIT I [12 Hours]

UNIT II [10 Hours]

UNIT III [10 Hours]

UNIT IV [10 Hours]
TCP IMPLEMENTATION I: Data structure and input processing – transmission control blocks – segment format – comparison – finite state machine implementation Output processing – mutual exclusion – computing the TCP Data length.

UNIT V [10 Hours]

Reference
UNIT – I [10 Hours]

UNIT - II [6 Hours]

UNIT – III [14 Hours]

UNIT – IV [10 Hours]

UNIT – V [12 Hours]

Reference
1. Cloud Computing – Insight into New Era Infrastructure, Dr. Kumar Saurabh, Wiley India, 2011.
MCA6E11: STORAGE AREA NETWORK

Total Teaching Hours: 52
No. of Hours /Week: 04

UNIT – I
Introduction: Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages. Case study: Replacing a server with Storage Networks The Data Storage and Data Access problem; The Battle for size and access.

UNIT – II
Intelligent Disk Subsystems: Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems, Availability of disk subsystems. I/O Techniques: The Physical I/O path from the CPU to the Storage System; SCSI; Fibre Channel Protocol Stack; Fibre Channel SAN; IP Storage.

UNIT – III
Network Attached Storage: The NAS Architecture, The NAS hardware Architecture, The NAS Software Architecture, Network connectivity, NAS as a storage system. File System and NAS: Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS.

UNIT – IV
Storage Virtualization: Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network. SAN Architecture and Hardware devices: Overview, Creating a Network for storage; SAN Hardware devices; The fibre channel switch; Host Bus Adaptors; Putting the storage in SAN; Fabric operation from a Hardware perspective.

UNIT – V
Software Components of SAN: The switch’s Operating system; Device Drivers; Supporting the switch’s components; Configuration options for SANs. Management: Planning Business Continuity; Managing availability; Managing Serviceability; Capacity planning; Security considerations.

Reference
UNIT – I [10 Hours]
Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi-Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.

UNIT -II [10 Hours]
Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

UNIT – III [10 Hours]
Overview, Motivation(for Data Mining), Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:- Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

UNIT – IV [10 Hours]
Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisions, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases – Apriori Algorithm, Mining Multilevel Association rules from Transactional Databases and Mining Multi-Dimensional Association rules from Relational Databases

UNIT – V [12 Hours]

Reference
2. Jiawei Han, Micheline Kamber, ”Data Mining Concepts & Techniques” Elsevier, 2013.

UNIT – I  

UNIT- II  

UNIT -III  

UNIT –IV  

UNIT- V  

Reference  
MCA603P: Main Project

The students are supposed to develop a main – project for above mentioned lab. The students should do the individual project. A project report must be submitted by each student. The students needs to carry out the project for four days in a week, and two days needs to attend the classwork.
BANGALORE UNIVERSITY
MCA PROGRAMME
Open Elective: “Cyber Space”

Total Teaching Hours: 52  No. of Hours / Week: 04

Objectives:
To understand cyber space, social media in cyber space, advantages, disadvantages, IT Act 2000/2008, Digital Signature, Electronic Signature, e-commerce, and e-governance

UNIT-I [20 Hours]
Basics of internet, www, http, html, DNS, IP Address, electronic mail, web browsers, search engines, Social Media: Twitter, Facebook, Youtube, whatsapp, LinkedIn, advantages, disadvantages, privacy issues

UNIT-II [10 Hours]
e-commerce, advantages of e-commerce, survey on popular e-commerce sites

UNIT-III [10 Hours]
Introduction to e-governance, stages of e-governance, advantages, challenges, International Status, Indian status

UNIT-IV [12 Hours]

Reference
1. Information Technology Amended Act, 2008, Ministry of Law and Justice, Government of India.
3. Tom Huskerson. Social Media, the Good, Bad, and Ugly: Volume. 3. 2014