# Rani Channamma University, Belagavi

## SCHOOL OF MATHEMATICAL AND COMPUTING SCIENCES

# DEPARTMENT OF COMPUTER SCIENCE

REVISED SYLLABUS

**of**

## MCA (MASTER OF COMPUTER APPLICATIONS)

**(With effect from 2016-2017 and onwards)**

# Scheme / Structure of Master of Computer Application

| Subject Code | Subject Title | Teaching Scheme Hrs/week | | Credits | Examination | | | |
| | | Theory | Practical | | Exam. Duration (Hrs) | Theory/ Practical | IA | Total |
|---|---|---|---|---|---|---|---|---|
| | **MCA I Semester** (w.e.f. 2016-17 and onwards) | | | | | | | |
| 16MCA11 | Discrete Mathematics | 4 | -- | 4 | 3 | 80 | 20 | 100 |
| 16MCA12 | Introduction to Unix | 4 | -- | 4 | 3 | 80 | 20 | 100 |
| 16MCA13 | Digital Logic and Computer Design | 4 | -- | 4 | 3 | 80 | 20 | 100 |
| 16MCA14 | Programming in C | 4 | -- | 4 | 3 | 80 | 20 | 100 |
| 16MCA15 | Professional Communication | 4 | -- | 4 | 3 | 80 | 20 | 100 |
| 16MCA16 | Mini Project using C | -- | 6 | 3 | 3 | 80 | 20 | 100 |
| 16MCA17 | Unix Lab. | -- | 6 | 3 | 3 | 80 | 20 | 100 |
| 16M8A18 | **Self Study:** 1. Web Technologies 2. Java Script | 2 | -- | 2 | | | 100 | 100 |
| | **Total** | **22** | **12** | **28** | **--** | **560** | **240** | **800** |

## II SEMESTER – MASTER OF COMPUTER APPLICATION

<table>
<tr><td colspan="10" align="center"><strong>MCA  II Semester</strong><br>(w.e.f. 2016-17 and onwards)</td></tr>
<tr><td rowspan="3">Subject Code</td><td rowspan="3">Subject Title</td><td colspan="2">Teaching Scheme Hrs/week</td><td rowspan="3">Credits</td><td colspan="4">Examination</td></tr>
<tr><td rowspan="2">Theory</td><td rowspan="2">Practical</td><td rowspan="2">Exam. Duration (Hrs)</td><td colspan="3">Marks</td></tr>
<tr><td>Theory/ Practical</td><td>IA</td><td>Total</td></tr>
<tr><td>16MCA21</td><td>Data Communications and Networks</td><td>4</td><td>--</td><td>4</td><td>3</td><td>80</td><td>20</td><td>100</td></tr>
<tr><td>16MCA22</td><td>Data Structures using C</td><td>4</td><td>--</td><td>4</td><td>3</td><td>80</td><td>20</td><td>100</td></tr>
<tr><td>16MCA23</td><td>Object Oriented programming with C++</td><td>4</td><td>--</td><td>4</td><td>3</td><td>80</td><td>20</td><td>100</td></tr>
<tr><td>16MCA24</td><td>System Software</td><td>4</td><td>--</td><td>4</td><td>3</td><td>80</td><td>20</td><td>100</td></tr>
<tr><td>16MCA25</td><td><strong>Open Elective</strong><br>Computers Concepts and C programming</td><td>4</td><td>--</td><td>4</td><td>3</td><td>80</td><td>20</td><td>100</td></tr>
<tr><td>16MCA26</td><td>Mini Project using  Data Structures</td><td>--</td><td>6</td><td>3</td><td>3</td><td>80</td><td>20</td><td>100</td></tr>
<tr><td>16MCA27</td><td>Object Oriented programming with C++</td><td>--</td><td>6</td><td>3</td><td>3</td><td>80</td><td>20</td><td>100</td></tr>
<tr><td>16MCA28</td><td><strong>Self Study:</strong><br>1.Statistical Methods<br>2.Graph Theory</td><td>2</td><td>--</td><td>2</td><td>--</td><td>--</td><td>100</td><td>100</td></tr>
<tr><td colspan="2" align="right"><strong>Total</strong></td><td><strong>22</strong></td><td><strong>12</strong></td><td><strong>28</strong></td><td><strong>--</strong></td><td><strong>560</strong></td><td><strong>240</strong></td><td><strong>800</strong></td></tr>
</table>

## MCA I Semester
(w.e.f. 2016-17 and onward)

| 16MCA11: Discrete Mathematics | |
|---|---|
| Teaching: 4 hrs./week | Max. Marks: 80 |
| Credits: 04 Hrs.: 52 | I. A. Marks: 20 |

**UNIT I**
Sets and Logic: Sets, propositions, conditional propositions and logical equivalence, arguments and rules of inference, quantifiers, nested quantifiers.

**08Hrs**

**UNIT II**
Proofs: mathematical systems, direct proofs, and counterexamples, more methods of proof, proving some properties of real numbers, resolution proofs, mathematical induction, strong form of induction and the well-ordering property.
Functions, Sequences, and Relations: functions, sequences and strings, relations, equivalence relations, matrices of relations, relational databases.
Partially ordered sets, lattices, finite Boolean algebra, functions on Boolean algebra.

**12Hrs**

**UNIT III**
Introduction to Number Theory: Divisors, representations of integers and integer algorithms, the Euclidean algorithm.
Counting Methods and the Pigeonhole Principle: Basic principles, permutations and combinations, generalized permutations and combinations, algorithms for generating permutations and combinations, discrete probability, binomial coefficients and combinatorial identities, The Pigeonhole Principle.
Recurrence Relations: Introduction, Solving Recurrence Relations.

**12 Hrs**

**UNIT IV**
Graph Theory: Introduction, Paths and Cycles, Hamiltonian Cycles and the Traveling Salesperson problem, a shortest-path algorithm, representations of graphs, isomorphisms of graphs, planar graphs.
Trees: Terminology and characterizations of trees, spanning trees,  minimal spanning trees, binary trees, tree traversals,         decision trees and the minimum time for sorting, isomorphism of trees,      game trees.

**10 Hrs**

**UNIT V**
Semi Groups and Groups: Semigroups, products and quotients of semigroups, groups, products and quotients of groups.
Groups and coding: Coding of Binary information and error detection, decoding and error detection.

**10 Hrs**

**Text Book:**
1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Fifth Edition, Tata McGraw Hill.
2. Deo N., "Graph theory with application to Engineering and Computer Science", Prentice Hall of India,
3. Kolman, Busby, Ross, "Discrete Mathematical Structures", Pearson Education.

| 16MCA12: Introduction to Unix | |
|---|---|
| Teaching: 4 hrs./week | Max. Marks: 80 |
| Credits: 04 Hrs.: 52 | I. A. Marks: 20 |

**UNIT – I**
**General Purpose Utilities:** banner, cal, date, calendar, who, printf, tty, stty,  uname, passwd, lock, echo, tput, bc, script, spell  and ispell.
**Navigating the File System:** The file, what's in a filename?  the parent-child relationship, pwd, the Home directory, Absolute pathnames, using absolute pathnames for a command, cd, mkdir, rmdir, Relative pathnames, The UNIX file system
**Handling Ordinary Files:** cat, cp, rm, mv, more, lp, file, wc, od, split, cmp, comm., diff.

**12 Hrs**

**UNIT – II**
**The vi editor:** The Three Modes, Input Mode, Saving, The Repeat Factor, Command Mode, Deletion, Navigation, Pattern Search, Joining lines, Repeating the Last command, undoing the Last Editing Instructions, Search and Replace.
**Basic File Attributes:**ls –l, the –d option, File Permissions, chmod.
**Security and File Permission:** users and groups, security level, changing permission, user masks, changing ownership and group
**Shell Programming:**Shell Scripts, read, Command Line Arguments, Exit Status of a Command, The Logical Operators && and ||, exit, if, and case conditions, expr, sleep and wait, while, until, for, $, @, redirection,  The here document, set, trap, Sample Validation and Data Entry Scripts.
**The Process:** process basics, PS, internal and external commands, running jobs in background, nice, at and batch, cron, time commands
**Customizing the Environment:** System Variables, profile, sty, PWD, Aliases, Command History, On-Line Command Editing

**12 Hrs**

**UNIT – III**
**More file attributes:** hard link, symbolic link, umask, find **Simple filters:** PR, head, tail, cut, paste, sort, uniq, tr commands

**8 Hrs**

**UNIT – IV**
**Filters using Regular Expression and the grep Family:**grep, Regular Expression, egrep, fgrep, a sed instruction, Line Addressing, Inserting and Changing Test, Context addressing, writing selected lines to a file, The –f option, Substitution, Properties of Regular Expressions
**Essential Shell Programming**: shell script, read, exit, the if conditional, using Tests and [] to evaluate expression, the case conditional expr, while: looping, for: looping with a list, set and shift, trap, debugging shell scripts with Set - X.
**Essential System Administration:**root, administartor's privileges, startup & Shutdown, managing disk space, cpio, tar **12 Hrs**
**UNIT – V**
a**wk-Advanced Filters:** Simple awk Filtering, Splitting a Line in to Fields, printf, the Logical and Relational Operators, Number Processing, Variables, The  -f option, The BEGIN and END Positional Parameters, get line, Built-in variables, Arrays, Functions, Interface with the Shell, Control Flow.
**Advanced Shell Programming:** The sh command, export, cd, the Command, expr, Conditional Parameter Substitution, Merging Streams, Shell Functions, eval, Exec Statement.
**Advanced vi:** Operators, the ex mode, named buffered , Numbered Buffers, Entering Control Characters, Searching for a Character, Marking Text Customizing, vi

**8 Hrs**

**Text Books:**
1. **UNIX Concepts and Applications**,  Sumitabha Das, 4th Edition, Tata McGraw Hill.
2. **UNIX and Shell Programming**, Behrouz A  Forouzan and Richard F Gilberg, 1st Edition, Thomson Course Technology.
**Reference Books:**
1. **UNIX: The Complete Reference**, Kenneth Rosonet al, Osborne/McGraw Hill.

| 2. | **Using UNIX** , Steve Montsugu, 2<sup>nd</sup> Edition, Prentice Hall India.. |
|---|---|
| 3. | **UNIX and Shell Programming**, M G Venkateshmurthy, Pearson Education Asia. |

## 16MCA13: Digital Logic and Computer Design

| Teaching: 4 hrs./week | Max. Marks: 80 |
|---|---|
| Credits: 04 Hrs. 52 | I. A. Marks: 20 |

### UNITI                                                                                                         10Hrs
Digital computers and digital systems, binary logic and gates, Boolean algebra, map simplification, map manipulation, NAND, NOR and Exclusive-OR gates, integrated circuits.
Combinational logic design: Combinational circuits, analysis procedure, decoders, encoders, multiplexers, binary adders, binary subtraction.

### UNIT II                                                                                                        10Hrs
Sequential circuits: Latches, flip-flops, sequential circuit analysis, sequential circuit design, designing with D and JK flip-flops.
Registers, shift registers, ripple counters, synchronous binary counters.

### UNIT III                                                                                                       10Hrs
Random access memory, RAM integrated circuits, array of RAM ICs, read-only memory, programmable logic array.
Register transfer operations, microoperations, multiplxer-based transfer, bus-based transfer, data paths, arithmetic/logic unit.

### UNIT IV                                                                                                        12Hrs
Computer architecture concepts, operand addressing, addressing modes, instruction set architectures, data transfer instructions, data manipulation instructions, program control instructions, program interrupts.

### UNIT V                                                                                                         10Hrs
Central Processing Unit designs: The complex instruction set computer, the reduced instruction set computer. Input-Output and Communication, memory systems hierarchy.

**Text Books:**
1. M. M. Mano and C. R. Kime, Logic and Computer Design Fundamentals, Pearson Education
2. Morris Mano M., Digital logic and Computer Design, PHI

**References:**
1. Floyd and Jain, Digital Fundamentals, 8/e, Pearson Education.
2. William Stallings, Computer Organization and Architecture, Pearson.
3. D. A. Patterson and J. L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, 4/e, Morgan Kaufmann.
4. Alan B Marcovitz, Introduction to logic and Computer Design, McGraw Hill.
5. Ronald J. Tocci, Digital Systems: Principals and Applications, 8/e, Pearson Education .
6. Bartee J. C., Digital Computer Fundamentals, 6/e, TMH.

| 12MCA14: Programming in C | |
|---|---|
| Teaching: 4 hrs./week<br>Credits: 04 Hrs.: 52 | Max. Marks: 80<br>I. A. Marks: 20 |

# UNIT I

## Constants, Variables and Data Types

Character set, C tokens, keywords & identifiers, 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 and Expressions

Arithmetic operators, relational operators, logical operators, assignment operator, increment and decrement operator, conditional operator, bitwise operators, comma operator, special operators, arithmetic expressions, evaluation of expressions, precedence of arithmetic operators, type conversions in expressions, operator precedence and associativity, mathematical functions

## 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.

**12 Hrs**

# UNIT II

## 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

## Arrays

The meaning of an array, one dimensional and two dimensional arrays, declaration and initialization of arrays, reading , writing and manipulation of above types of arrays, multidimensional arrays, dynamic arrays, programming examples.

## Character Arrays and Strings

Declaring and initialing string variables, reading string from terminal, writing string to screen, arithmetic operations on characters, putting strings together, comparison of two strings, string handling functions, table of strings, other features of strings, programming examples.

**12 Hrs**

# UNIT III

## User Defined Functions

Need for user defined functions, a multi function program, elements of User defined functions, defining functions, return values and their types, function calls, function declaration, category of functions, no arguments and no return values, arguments but no return values, arguments with return values, no arguments with return value, functions that return multiple values, nesting of functions, recursion, passing arrays to functions, passing string to functions, programming examples.

## 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

**10Hrs**

**UNIT IV**
**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
**Dynamic Memory Allocation**
Dynamic memory allocation, allocating a block of memory: m*alloc,* allocating multiple blocks of memory: *calloc*, releasing the used space: *Free*, altering the size of a block: r*ealloc*, programming examples

**10Hrs**

**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.
**The Preprocessor**
Introduction, macro substitution, files inclusion, compiler control directives, ANSI additions, programming exercises.

**8 Hrs**

**Text Books:**
1.  **Programming in ANSI C**, Balagurusamy, 3rd Edition, Tata McGraw Hill.
2.  **Computer Programming in C**, V Rajaraman, Prentice Hall India.

**Reference Books**:
1.  **Structured Programming Approach C**, Behrouz A Forouzan and Richard F Gilberg, 2nd Edition, Thomson.
2.  **Beginning C:** From Novice to Professional, Ivor Horton, 4th Edition, Springer, India.
3.  **Programming with ANSI and Turbo C**, Ashok N Kamthane, 1st Edition, Pearson Education Asia.
4.  **Mastering C**, K R Venugopal, S R Prasad, Tata McGraw Hill.

| 16MCA15: Professional Communication | |
|---|---|
| **Teaching: 4 hrs./week** | **Max. Marks: 80** |
| **Credits: 04 Hrs.: 52** | **I. A. Marks: 20** |

## UNIT – I

**Basics of Technical Communication:** Introduction, Process of Communication, Language as a Tool, Levels of Communication, Levels of Communication, Communication Networks, Importance of Technical Communication

**Barriers to Communication:** Definition of Noise, Classification of Barriers

**8 Hrs**

## UNIT – II

**Technology in Communication:** Impact of Technology, Software for Creating Messages, Software for Writing Documents, Software for Presenting Documents, Transmitting Documents, Effective use of Available Technology

**Active Listening:** Introduction, Types of Listening, Traits of good Listener, Active versus passive listening, implications of effective listening

**8 Hrs**

## UNIT – III

**Effective Presentation Strategies:** Introduction, Defining purpose, Analyzing Audience and Locale, Organizing Contents, preparing outline, Visual Aids, Understanding Nuances of Delivery, Kinesics, Proxemics, Paralinguistic's, Chronemics, Sample speech.

**Group Communication:** Introduction, Group Discussion, Organizational Group discussion, Group discussion as part of selection process Meetings, conferences.

**Research paper, Dissertation and Thesis:** Introduction, Research paper, Dissertation, Thesis

**12 Hrs**

## UNIT - IV

**An Overview of Ethics:** What are Ethics? Ethics in the Business World, Ethics in Information Technology (IT)

**Ethics for IT Professionals and IT users:** IT professionals, The Ethical behavior of IT professionals, IT Users

**Privacy:** Privacy Protection and the Law, Key Privacy and Anonymity Issues

**12 Hrs**

## UNIT – V

**Software Development:** Strategies to Engineer Quality s/w, Key Issues

**Employer/Employee Issues:** Use of Non traditional workers, Whistle Blowing

**Case Studies and Discussion**

**12 Hrs**

**Text Books:**
1. **Technical Communication - Principles and Practices**, Meenakshi Raman and Sangeeta Sharma, Oxford University Press.
2. **Ethics in Information Technology**, George Reynolds, Thomson Course Technology.

**Reference Books:**
1. **Effective Technical Communication** by M.AshrafRizivi, 1st Edition, Tata McGraw Hill.
2. **Ethics in Engineering** by Mike W Martin and Ronald Schinzinger, 3rd Edition, Tata McGraw.

| 16MCA16: Mini project using C | |
|---|---|
| **Teaching: 6 hrs./week**<br>**Credits: 03 Hrs.: 52** | **Max. Marks: 80**<br>**I. A. Marks: 20** |

**Section I:** Following features of **C** shall be implemented

Control Statements, Control loop structure,User defined functions, array manipulation, dynamic memory allocation, pointer to array,

array of pointers, structures, union, files, command line parameters.

**Section II:** Assignments based on the paper 12MCA12: Problem Solving Techniques shall

beimplemented using C.

Students shall gain familiarity with UNIX/Linux platform for executing C programs.

**Section III:Mini Project**

- **Objective:** To develop a good application using the techniques they have learnt during the semester. At the end of semester the students are expected to learn how to develop a small application in C with
  Modular approach,
  Coding standards,
  Documented and
  Indented.

**Mini Project guidelines:**

**1. The mini project shall be carried out in team of minimum of Two or maximum of Three students.**

**2. The team has to give two seminars on their project work.**

**Evaluation:**

**1. The final examination is only on Mini Project.**

**2.The mini project shall be evaluated for**

   **Project Report  : 10 Marks**
   **Presentation      : 20 Marks**
   **Demonstration  : 30 Marks**
   **Viva-Voce         : 10 Marks**
   **Modifications    : 10 Marks**

**Sample Applications Mini project**

1. **Building Dictionary**
2. **Building Pay-roll System**
3. **Building Yellow Pages**
4. **Building Simple Inventory Control System**
5. **Building Simple Banking system (SB/Current/Loan)**
6. **Building Simple Insurance system**
7. **Simulation of DOS Commands.**
8. **Building simple student grade system for SEE.**
9. **Building Telephone directory system**
10. **Building simple  System**

| 16MCA17: Unix Lab. | |
|---|---|
| **Teaching: 6 hrs./week** | **Max. Marks: 80** |
| **Credits: 03 Hrs.: 52** | **I. A. Marks: 20** |

1. a. Write a non-recursive shell script which accepts any number of arguments and prints them in the reverse order (For example, if the script is named rags, then executing  rags A B C should produce C B A on the standard output).
   b. Write a shell script that accepts two file names as arguments, checks if the permissions for these files are identical and if the permissions are identical, output common permissions and otherwise output each file name followed by its permissions.

2. a. Write a shell script that takes a valid directory name as an argument and recursively descend all the subdirectories, finds the maximum length of any file in that hierarchy and writes this maximum value to the standard output.
   b. Write a shell script that accepts a path name and creates all the components in that path name as directories. For example, if the script is named mpc, then the command mpc a/b/c/d should create directories a, a/b, a/b/c, a/b/c/d.

3. a. Write a shell script which accepts valid log-in names as arguments and prints their corresponding home directories, if no arguments are specified, print a suitable error message.
   b. Write shell script to implement terminal locking (similar to the lock command). It should prompt the user for a password. After accepting the password entered by the user, it must prompt again for the matching password as confirmation and if match occurs, it must lock the keyword until a matching password is entered again by the user, Note that the script must be written to disregard BREAK, control-D. No time limit need be implemented for the lock duration.

4. a. Create a script file called file-properties that reads a file name entered and outputs it   properties.
   b. Write a shell script that accept one or more filenames as argument  and convert all of them to uppercase, provided they exist in current directory.

5. a. Write a shell script that displays all the links to a file specified as the  first argument to the script. The second argument, which is optional, can be used to specify in which the search is to begin. If this second argument is not present, the search is to begin in current working directory. In either case, the starting directory as well as all its subdirectories at all levels must be searched. The script need not include any error checking.
   b.  Write a shell script that accepts as filename as argument and display its creation time if file exist and if it does not send output error message.

6. a. Write a shell script to display the calendar for current month with current date            replaced by * or ** depending on whether the date has one digit or two digits.
   b. Write a shell script to find smallest of three numbers that are read from keyboard.

7. a. Write a shell script using expr command to read in a string and display a suitable message if it does not have at least 10 characters.
   b. Write a shell script to compute the sum of number passed to it as argument on command line and display the result.

8. a. Write a shell script that compute gross salary of an employee, accordingly to rule  given below.
      If basic salary is < 15000 then HRA=10% of basic 7 DA=90% of basic.
      If basic salary is >=15000 then HRA=500 of basic & DA=98% of basic.
   b. Write a shell script that delete all lines containing a specific word in one or more file supplied as argument to it.

9. a. Write a shell script that gets executed displays the message either "Good Morning" or

"Good Afternoon" or "Good Evening" depending upon time at which the user logs in.
   b.  Write a shell script that accept a list of filenames as its argument, count and report occurrence of each word that is present in the first argument file on other argument files.
10. a. Write a shell script that determine the period for which a specified user is working on system.
   b.  Write a shell script that reports the logging in of a specified user within one minute after he/she log in. The script automatically terminate if specified user does not log in during a specified period of time.
11. a. Write a shell script that accepts two integers as its argument and compute the value of first number raised to the power of second number.
   b.  Write a shell script that accept the file name, starting and ending line number as an   argument and display all the lines between the given line number.
12. a. Write a shell script that folds long lines into 40 columns. Thus any line that exceeds 40 characters must be broken after $40^{th}$, a "\" is to be appended as the indication of  folding and the processing is to be continued with the residue. The input is to be supplied through a text file created by the user.
   b.  Write an awk script that accepts date argument in the form of mm-dd-yy and displays it in the form if day, month, and year. The script should check the validity of the argument and in the case of error, display a suitable message.
13. a. Write an awk script to delete duplicated line from a text file. The order of the original lines must remain unchanged.
   b.  Write an awk script to find out total number of books sold in each discipline as well as total book sold using associate array down table as given below.

|       |                  |     |
| ----- | ---------------- | --- |
| i.    | Electrical       | 34  |
| ii.   | Mechanical       | 67  |
| iii.  | Electrical       | 80  |
| iv.   | Computer Science | 43  |
| v.    | Mechanical       | 65  |
| vi.   | Civil            | 198 |
| vii.  | Computer Science | 64  |

14.  Write an awk script to compute gross salary of an employee accordingly   to rule given below.
   If basic salary is < 10000 then HRA=15% of basic & DA=45% of basic.
   If basic salary is >=10000 then HRA=20% of basic & DA=50% of basic.

# Self-Study

| 16M.Sc18.1: Web Technologies |
|---|

**Contact Hours: 02 Hrs/week**
**Credits:2**                                                    **I. A. Marks: 100**

**Web Foundations:** Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, the Web Programmers Toolbox. Evolution of the Web, Peak into the History of the Web, Internet Applications, Networks, TCP/IP, Higher Level Protocols, Important Components of the Web, Web Search Engines, Application Servers.

**Introduction to XML:** Introduction, Syntax , Document structure, Document type definitions, Name spaces , XML schemas, displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.

**Perl and CGI:** 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. Using Perl for CGI Programming: The Common Gateway Interface; CGI linkage; Query string format; CGI.pm module; A survey example; Cookies.

**Reference Books:**
1. Pam Selle, Tim Ruffles, Christopher Hiller, Jamie, "Choosing a JavaScript Framework", 7th Edition, Addison Wesley, 2012.
2. Brad Green, Shyam Seshadri , "AngularJS", 1st edition, O'Reilly Media, April 2013.
3. Jeff Forcier, "Python Web Development with Django", 1st edition, Pearson Education, 2008.
4. Michael Hartl, "Ruby on Rails Tutorial: Learn Web Development with Rails (2nd Edition) (Addison-Wesley Professional Ruby)".

| 16M.Sc18.2: Java Script |
|---|

**Contact Hours: 2 hrs./week**
**Credits: 2**                                                                                    **I. A. Marks: 100**

**Basics of JavaScript:** Overview of JavaScript, Object orientation and JavaScript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples.

**JavaScript and HTML Documents:** The JavaScript Execution Environment, The Document Object Model, Elements Access in Java Script, Events and Event Handling, Handling Events from Body Elements, Handling Events from Text Box and password Elements, The DOM2 Event Model, The navigator Object, Dom Tree Traversal and Modification.

**Dynamic Documents with JavaScript:** Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements.

**Reference Books:**
1. Kenneth Rosonet al, Java Scripting: The Complete Reference, Osborne/McGraw Hill.
2. Sumitabha Das,Java Scripting,  , 4<sup>th</sup> Edition, Tata McGraw Hill.

| 16MCA21: Data Communication and Networks | |
|---|---|
| Teaching: 4 hrs./week | Max. Marks: 80 |
| Credits: 04 Hrs.: 52 | I. A. Marks: 20 |

**UNIT I**       **10Hrs**

Introduction: Data Communications, Networks, the internet, protocols and standards, network models – OSI model, TCP/IP protocol suite, addressing.

**UNIT II**       **10Hrs**

Data and Signals: Periodic analog signals, digital signals, transmission impairment, data rate limits, performance.
Digital transmission: Digital to digital conversion, analog-to-digital conversion, transmission modes.

**UNIT III**       **12Hrs**

Physical Layer and Media: Analog transmission: Digital-to-analog conversion, analog-to-analog conversion. Multiplexing Spread spectrum. Transmission media – Guided media and unguided media.

**UNIT IV**       **10Hrs**

Switching: Circuit-switched networks, datagram networks, virtual-circuit networks, structure of a switch.
Telephone networks, dialup modems, digital subscriber line, cable-tv networks,

**UNIT V**       **10Hrs**

Detection and Correction: Errors, redundancy, detection versus correction, block coding, linear block codes, cyclic codes, checksum.
Data Link Control: Framing, flow and error control, noiseless and noisy channels, HDLC, point-to-point control.
Multiple Access: Random access ALOHA, controlled access, channelization.

**Text Books:**

1. **Behrouza A Forouzan, Data Communications and Networking, McGrawHill.**
2. Computer Networks - Andrew s. Tanenbaum, Pearson Education.

**References:**

1. Data and Computer Communications, William Stallings, Pearson education
2. Data Communications, Computer Networks and Open Systems, fourth edition-Fred Halsall, Addison Wesley.

| 16MCA22: Data Structure using C | |
|---|---|
| Teaching: 4 hrs./week | Max. Marks: 80 |
| Credits: 04 Hrs.: 52 | I. A. Marks: 20 |

**UNIT I**
**The Stack:** Definition and examples, Primitive operations, Example, The stack as an ADT, Representing stacks in C, Implementing the pop operation, Testing for exceptional conditions, Implementing the push operation, Examples for infix, postfix, and prefix expressions, Basic definition and examples, Program to evaluate a postfix expression, Converting an expression from infix to postfix, Program to convert an expression from infix to postfix.

**10Hrs**

**UNIT II**
**Recursion and Queues:** Recursive definition and processes, Factorial function, Multiplication of natural numbers, Fibonacci sequence, Binary search, Properties of recursive definition or algorithm. Recursion in C, Factorial in C, Fibonacci numbers in C, Binary search in C, Towers of Hanoi problem. The queue and its sequential representation, the queue as ADT, C implementation of queues, Insert operation, Priority queue, Array implementation of a priority queue.

**12Hrs**

**UNIT III**
 **Lists:** Linked lists, Inserting and removing nodes from a list, Linked implementation of stacks, getnode and freenode operations, Linked implementation of queues, Linked list as a data structure, Example of list operations, Header nodes, Lists in C, Array implementation of lists, Limitations of array implementation, allocating and freeing dynamic variables, Linked lists using dynamic variables, Queues as lists in C, Examples of list operations in C, Non integer and non-homogeneous lists, Other list structures: Circular lists, Stack as a circular list, Queue as a circular list, Primitive operations on circular lists, doubly linked lists

**12 Hrs**

**UNIT IV**
**Trees:**Binary trees, operations on binary trees, Applications of binary trees, Binary tree representation, Node representation of binary tree, Internal and external nodes, Implicit array representation of binary trees, Choosing a binary tree representation, Binary tree traversal in C, Threaded binary trees.

**10Hrs**

**UNIT V**
**Graphs and Their Applications:** Graphs: Definitions, Application of graphs, C representation of graphs, Traversal methods for graphs, Depth first traversal, Breadth first traversal

**8 Hrs**

**Text Book:**
1. Data Structures using C By A.M.Tenenbaum, YLangsam, M.J.Augustein, R.L.Kruse, B.P.Leung and C.L.Tondo, PHI.

**Reference Books:**
1. **Data Structures and Algorithm Analysis in C**, Mark Allen Weiss, 2nd Edition, Pearson Education Asia.
2. **Data Structures - A Pseudocode Approach with C**, Richard F Giberg and Behrouz A Forouzan, 3rd Reprint, Thomson Course Technology.

| 16MCA23: Object Oriented Programming in C++ | |
|---|---|
| Teaching: 4 hrs./week | Max. Marks: 80 |
| Credits: 04 Hrs.: 52 | I. A. Marks: 20 |

## UNIT I

Overview of C++: Object Oriented Programming concepts, advantages, C++ program development environment, the C++ language standards, C++ as a superset of C.

Classes & Objects: classes, structure & classes, union & classes, inline function, scope resolution operator, static class members: static data member, static member function, passing objects to function, returning objects, object assignment, constructors & destructors, friend function, friend classes.

**10Hrs**

## UNIT II

References & Dynamic Allocation Operators: array of objects, pointers to object, type checking C++ pointers, the this pointer, pointer to derived types, pointer to class members, reference parameter, call by reference and return by reference, passing references to objects, returning reference, C++'s dynamic allocation operators, allocating objects,

**10Hrs**

## UNIT III

Overloading as polymorphism:function & operator overloading, operator overloading restrictions, operator overloading using friend function.

Namespaces: global namespace and namespace std, nested namespaces

Inheritance : base class access control, inheritance & protected members, protected base Class inheritance, inheriting multiple base classes, constructors, destructors & inheritance, execution of constructor & destructor functions, passing parameters to base class constructors, granting access, virtual base classes .

Virtual Functions & Polymorphism: virtual function, pure virtual functions, early vs. late binding.

**12Hrs**

## UNIT IV

Templates and Exception Handling: Exception handling in C++, try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler, Templates: Reason for templates, compactness and flexibility, function template, class templates.

The C++ I/O System Basics: C++ Streams, the basic stream classes, c++ predefined streams, formatted I/O, file processing.

**10Hrs**

## UNIT V

Overview of the Standard Template Library: The Standard Template Library, Design goals, Header files, STL components, STL Example: vectors, lists, maps, sets. Containers-Vector, Deque, List, Associative Containers, Set, Multiset, Map, Multimap. Iterators: Input iterators, Output iterators, Forward iterators, Backward iterators.

**10Hrs**

**References:**
1. Herbert Schildt, C++ The Complete Reference,Tata McGraw Hill Publication.
2. Al Stevens,C++ Programming, Wiely Publications.
3. S. B. Lippman& J. Lajoie, C++ Primer, 3rd Edition, Addison Wesley.
4. B. A. Forouzon, R. F. Gilberge, Computer Science: A Structured Approach Using C++, Thomson Learning.
5. Stroubstrup B., The C++ Programming Language, Addison Wesley.
6. William H. Murray, Chris H. Pappas, Data structures with STL Prentice Hall PTR.

| 16MCA24: System Software | |
|---|---|
| Teaching: 4 hrs./week | Max. Marks: 80 |
| Credits: 04 Hrs.: 52 | I. A. Marks: 20 |

**UNIT I**

Introduction: System software and machine architecture, the simplified instructional computer (SIC), traditional (CISC) machines, RISC machines

**10Hrs**

**UNIT II**

Assemblers- Basic Assembler Functions, Machine-Dependent Assembler Features, Machine-Independent Assembler Features, Assembler Design Options, Implementation Examples

**10Hrs**

**UNIT III**

Loaders and Linkers: - Basic Loader Functions, Machine-Dependent Loader Features, Machine-Independent Loader Features. Loader Design Options, Implementation Examples, MS-DOS Linker.

**12Hrs**

**UNIT IV**

Macro Processors: - Basic Macro Processor Functions, Machine-Independent Macro Processor Features, Macro Processor Design Options, Implementation Examples.

**10Hrs**

**UNIT V**

Compilers: - Basic Compiler Functions, Machine-Dependent Compiler Features, Machine-Independent Compiler Features, Compiler Design Options, Implementation Examples.

**10Hrs**

**Text Book:**
1. Leland L.Beck, 'System Software: An introduction to Systems Programming', 3rd E, Addison Wesley
2. Dhamdhere D.M, 'Introduction to System Software', Tata McGraw Hill.

**References:**

1. Donovan J J, 'Systems Programming', McGraw Hill.
2. A.V. Aho, R. Semi, J.D. Ullman, Compilers - Principles, techniques and tools, Pearson Education.
3. D.M. Dhamdhere, Systems Programming and Operating Systems, Tata McGraw Hill.
4. SantanuChattopadhyay, Compiler Design, PHI.
5. Johns.Robin& Stewart, 'The art of Programming', Narosa Pub. House,

| 16MCA25 OE: Computer Concepts and C Programming | |
|---|---|
| Teaching: 4 hrs./week | Max. Marks: 80 |
| Credits: 04 Hrs.: 52 | I. A. Marks: 20 |

**UNIT I**

Computer Fundamentals: Block structure of a computer, characteristics of computers, problem solving with computers, generation of computers, classification of computers, input and output units.

Number System : Bit, byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other, error detecting codes, representation of characters, integers, and fractions, Binary Arithmetic - Addition, subtraction and multiplication.

**10Hrs**

**UNIT II**

Computer languages:Machine language, assembly language, higher level languages.

Operating system: Batch, multi-programming, time sharing, PC operating system, network operating system, on-line and real time operating system, mobile OS.

Problem Solving With Computer: Problem definition, analysis, algorithm, flowchart, coding, debugging, testing and documentation.

**12Hrs**

**UNIT III:** Word processing:

Overview of Word, starting word, new document, basic text manipulation, formatting text, working with document scrolling, zooming, ruler, cut ,copy, collect and paste, undo and redo, page breaks, using columns with sections, headers and footers. styles and themes, Automatic features, Tabulation, Tables and Charts. Templates, wizards and graphical features.

**10Hrs**

**UNIT IV**

Presentation graphics: Presentation basics, ingredients of a good presentation, presentation packages, Microsoft Power Point, PowerPoint startup Dialogue box, PowerPoint views, creating and saving a presentation using auto content wizard, setting slide transitions, slide show view.

Spread Sheets: Introduction to spread sheet & Excel, working in Excel, Mathematical calculations, manipulating data, changing the layout, simple graphs, database management, manipulating sheets.

**10Hrs**

**UNIT V**

Computer Networks: Introduction, overview of a network, communication processors, communications media, telecommunication software, types of networks.

Computer crimes, computer security, computer viruses.

**10Hrs**

**References:**
1. Ann Ambrose, Dolores J. Wells, Computer Concepts BASICS, Thomson Learning
2. A. Leon and M. Leon, Fundamentals of Information Technology, Leon Vikas publishing Williams, Sawyer, Information Technology, 5/e, Tata McGraw Hill
3. Gary B. Shelly, Thomas J. Cashman, Misty E. Vermaat, Discovering Computers- Fundamentals, Thomson Learning
4. V. Rajaraman, Fundamentals of Computers, ,PHI
5. Curtin, Foley and Morin, Information Technology, Tata McGraw Hill

| 16MCA26: Mini Project using Data Structures | |
|---|---|
| Teaching: 6 hrs./week | Max. Marks: 80 |
| Credits: 03 Hrs.: 52 | I. A. Marks: 20 |

**Section I :**

Assignments based on the paper 12MCA27: Data Structures using C shall be implemented.

Assignments should include but not limited to-

- Stacks and Queues: adding, deleting, searching elements
- Evaluation of expressions
- Conversionof Expression
- Circular Queue: Adding & deleting elements
- Linked lists: inserting, deleting, inverting a linked list
- Recursive and Nonrecursive traversal of Trees
- Binary tree operations
- Application of Trees.
- Graph algorithms.

**Section III:Mini Project**

- **Objective:** To develop a good application using the techniques they have learnt during the semester. At the end of semester the students are expected to learn how to develop an application using Data Structure with

    Modular approach,
    Coding standards,
    Documented and
    Indented.

| 16MCA27: Object Oriented programming with C++ Lab | |
|---|---|
| **Teaching: 6 hrs./week** | **Max. Marks: 80** |
| **Credits: 03 Hrs.: 52** | **I. A. Marks: 20** |

**Section I:**

Following features of C++ programming language shall be implemented:
Control structures, user defined functions, overloaded functions, dynamic memory allocation, classes and objects, operator overloading, inheritance, virtual polymorphism, class and function templates, files, Exception Handling and Templates, STL.

# Self-Study

| 16MCA28.1: Statistical Methods |
|---|
| **Contact Hours: 2 hrs./week** |
| **Credits: 2**                                                          **I. A. Marks: 100** |

**Description of data:** Introduction-Data, Type of Variables, One dimensional and two dimensional tables, mean, weighted mean, median, mode, Quartiles, Variance, Coefficient of variation, skewness, Histogram, Box plots, Quantile plots, Quantitle Qunatile plots, Scatter plot, Loess curve fitting.

**Correlation and Regression:** Meaning of correlation and regression, coefficient of correlation, Linear regression, Multiple regression, Logistic Regression.

**Sampling and Hypothesis testing -1:** Introduction-Sampling, SRSWR, SRSWOR, Cluster Sampling, Stratified Sampling, Basic terminologies of testing hypothesis, Confidence interval, Sample size determination.

**Hypothesis Testing:** Hypothesis test for: proportions, means(Large and small samples), test for independence of attributes (m x n contingency table) Inference based on choice of suitable test procedure.

**Text Books:**
1. J. Susan Milton, Jesse C. Arnold, Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences, 4th Ed, TATA McGraw-Hill Edition 2007.
2. Jiawei Han, Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, 2005.
3. Kishor S Trivedi, probability and statistics with reliability queuing and computer science applications, 1st ed, PHI, 2000.

**Reference Books:**
1. Gupta S C and Kapoor V K, Fundamentals of Mathematical Statistics, 1st ed, Sultan Chand & Sons, New Delhi, 2000.

| 16MCA28.2: Graph Theory |
|---|

**Contact Hours: 2 hrs./week**
**Credits: 2**                                    **I. A. Marks: 100**

**Introduction to Graph Theory:** Definitions and Examples, Sub graphs, Components, and Graph Isomorphism, Vertex Degree, Perfect graphs, Planar graphs.

**Connectivity and Paths:** Walk, Paths and Circuits, Euler Graph, Operations on Graphs, Connectivity, Hamilton city: Hamilton Paths and Cycles.

**Graph Coloring:** Matchings, Vertex Coloring, Edge Coloring, Other Coloring Problems, Four Color Problems.

**Text Books:**
1. Narsingh Deo , **Graph Theory with Application to Engineering and Computer Science,** , 4th Edition, PHI Learning.
2. Narsingh Deo, **Graph Theory and Applications**, 3rd Edition, PHI Learning

**Reference Books:**
3. **R.Diestel, Graph Theory,** Springer-Verlag, 2nd Edition, 2000.