SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

Sree Sainath Nagar, Tirupati

Department of Master of Computer Applications

Supporting Document for 1.1.2

Syllabus Revision carried out in 2016

Program: MCA- Master of Computer Applications

Regulations : SVEC-16

This document details the following:

1. Courses where syllabus has been changed 20% and more.
2. Course-wise revised syllabus with changes highlighted.

Note: *For SVEC-16 revised syllabus, SVEC-14 (previous syllabus) is the reference.*

List of Courses where syllabus has been changed (20% and more)

Course Code	Name of the course	Percentage of Syllabus changed	Page Number in which Details are Highlighted
16MC10103	Programming in C	20	2
16MC1HS31	English Language Laboratory	100	6
16MC10131	IT Lab	35	11
16MC10132	Programming in C Lab	35	19
16MC20101	Database Management Systems	35	24
16MC20104	Software Engineering	80	29
16MC20131	Database Management Systems Lab	40	33
16MC20132	Data Structures Through C Lab	45	37
16MC3HS01	Organizational Behavior And Human Resource	35	42
16MC30101	Computer Networks	20	46
16MC30103	Computer Networks Lab	85	51
16MC30132	Data Warehousing and Data Mining Lab	60	57
16MC30133	Object Oriented Analysis and Design Lab	90	63
16MC40101	Big Data Analytics	35	68
16MC40102	LINUX Programming	100	72
16MC40104	Service Oriented Architecture	90	74
16MC40105	Internet of Things	100	78
16MC40106	Computer Forensics	100	80
16MC40110	Wireless Networks	100	83
16MC4HS31	Soft Skills Laboratory	100	85
16MC40131	Big Data Analytics Lab	100	89
16MC40132	LINUX and Web Programming Lab	50	92
16MC50101	Cloud Computing	100	96
16MC50103	Software Testing	40	101
16MC50104	Software Quality Assurance	100	105
16MC50105	Semantic Web	100	107
16MC50109	Bioinformatics	100	111
16MC50110	Ethical Hacking	100	113
16MC50111	Multimedia and Rich Internet Application development	40	115
16MC50131	Cloud Computing Lab	100	119
	Average	**71.17**	
	Total No. of Courses in the Program	55	
	No. of Courses where syllabus (more than 20%) has been changed	30	
	Percentage of Syllabus changed in the Program	**38.82**	

DEAN (Academics)

Dean (Academics)
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PRINCIPAL

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Sree Sainath Nagar, A. RANG...
Chittoor (Dist.) - 517 102, A.P., In...

MCA I-SEMESTER

16MC10103: PROGRAMMING in C

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: --

COURSE DESCRIPTION:
Computer systems and Environments; Analysis and Efficiency of algorithms done with problem solving approaches; basic elements of C and data types; working with conditional and unconditional statements along with iterations; Handling strings and derived data types using modular programming; Handling files and dealing with preprocess directives; Command line argument and its usage; develop programs to solve real world problems.
COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Exhibit knowledge in
- C Tokens
- Input/output Formatting styles
- Control statements
- Data types
- Dynamic allocation functions
- Preprocess Directives

CO2. Analyze the efficiency of algorithms to solve computational problems using top down approach.
CO3. Design and develop the solutions using the techniques-parameter passing mechanism, command line arguments and recursion for real world problems.
CO4. Implement the concepts of modular programming language which includes functions, pointers and structures to solve complex problems.
CO5. Adapt preprocess directives, sequential and random access to text/binary files for persistent data storage for real world applications using Turbo C.
CO6. Engage lifelong learning and develop programming competency.

DETAILED SYLLABUS:
UNIT - I: INTRODUCTION TO COMPUTERS, PROBLEM SOLVING AND C LANGUAGE (11 Periods)

Computer Systems, Computing Environments, The Problem, Solving Aspect, Creating and Running Programs; Implementation of Algorithms, The Efficiency of Algorithms, The Analysis of Algorithms; Introduction to the C Language: Structure of a C Program, Identifiers, Types, Variables, Constants, keywords, Expressions, precedence and Associativity, Evaluating Expressions, Type Conversion.

UNIT - II: PROGRAM CONTROL STATEMENTS, ARRAYS AND STRINGS (11 Periods)

Program Control Statements: Two way selection: if, if else, nested if else. Multi way selection- else if ladder and switch statement. Repetition: concept of loop, for loop, while loop, do while loop. Break, continue and goto statement.
Arrays, Strings: Array concept, types of array: one dimensional, two dimensional and multi-dimensional arrays. Introduction to string, string representation and initialization, array of strings, string manipulation functions.

UNIT - III: MODULAR PROGRAMMING (11 Periods)

Pointers: Introduction, declaration and initialization, arithmetic operations on pointers, Array of pointers, pointer to an array, Dynamic memory management functions: malloc, calloc and realloc and free.
Functions: Introduction to function, system defined and user defined function. Local and global variable. Parameter passing mechanism: pass by value and pass by reference. Scope,

Storage classes, Recursion: recursive function, application of recursion: factorial calculation and Fibonacci number generation.

UNIT-IV: DERIVED DATA TYPES (11 Periods)

Derived Data Types: Introduction to structure: structure declaration and initialization, anonymous structure, accessing operators, nested structure**.** Array of structure, array within a structure, pointer to structure, passing structures through function. Union: declaration, initialization and its usage. Typedef, enumerated types and bit field. Application of structure with pointer: static and dynamic linked list representation.

UNIT-V: FILES AND PREPROCESSOR DIRECTIVES (11 Periods)

Introduction to files, types of files: binary and text file. Operations on File: open, close, read, write, seek, and etc., read data from files, writing data to files. Program to implement sequential access and random access. Preprocessor directive statements and its usage. Command line argument and its usage.

Total Periods: 55

TEXT BOOKS

1. B.A. Forouzan, "*A Structured programming approach using C*," Cengage learning, 3rd Edition, 2007.
2. R.G.Dromey, "*How to Solve it by Computer*", Pearson Education, 2007.

REFERENCE BOOKS

1. Herbert Schiltz*,"Turbo C/C++ The complete Reference,"* Tata McGraw-Hill, 2007.
2. BS Gottrifried, A. Mittal, *"Programming in C – A practical approach,"* PHI, Tata MC Grawhill, 2007.

MCA I-SEMESTER
14MC10101: PROGRAMMING THROUGH C

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*3*	*1*	*-*	*3*

PRE-REQUISITES:--

COURSE OBJECTIVES:

I. To understand various steps involved in Program development and basic concepts in C Programming Language.
II. To read and write C program that uses pointers, structures and files.
III. To help students to understand the implementation of C language.

COURSE OUTCOMES:

After the completion of the course, a successful student able to:

1. Solve the given problem using the syntactical structures of C language.
2. Develop, execute and document solution for various problems using the features of C language.
3. Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT-I: INTRODUCTION TO COMPUTERS AND C LANGUAGE AND PROGRAM CONTROL STATEMENTS (12 PERIODS)

Introduction to Computers and C Language: Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, System Development; Introduction to the C Language: Structure of a C Program, Identifiers, Types, Variables, Constants, keywords, Expressions, precedence and Associativity, Evaluating Expressions, Type Conversion.

Program Control Statements: Two way selection: if, if else, nested if else. Multi way selection- else if ladder and switch statement; Repetition: concept of loop, for loop, while loop, do while loop. Break, continue and goto statement.

UNIT-II: ARRAYS, STRINGS AND POINTERS (12 PERIODS)

Arrays, Strings: Array concept, types of array: one dimensional, two dimensional and multi-dimensional arrays. Introduction to string, string representation and initialization, array of strings, string manipulation functions.

Pointers: Introduction, declaration and initialization, arithmetic operations on pointers, Array of pointers, pointer to an array, Dynamic memory management functions: malloc, calloc and realloc and free.

UNIT-III: FUNCTIONS (12 PERIODS)

Functions: Introduction to function, system defined & user defined function. Local and global variable. Parameter passing mechanism: pass by value and pass by reference. Scope, Storage classes, Recursion: recursive function, application of recursion: factorial calculation and Fibonacci number generation.

UNIT-IV: DERIVED DATA TYPES (12 PERIODS)

Derived Data Types: Introduction to structure: structure declaration and initialization, anonymous structure, accessing operators, nested structure**.** Array of structure, array within a structure, pointer to structure, passing structures through function. Union: declaration, initialization and its usage. typedef, enumerated types and bit field. Application of structure with pointer: static and dynamic linked list representation.

UNIT-V: FILES AND PREPROCESSOR DIRECTIVES (10 PERIODS)

Files and Preprocessor Directives: Introduction to file, types of file: binary and text file. Operations on File: open, close, read, write and seek. Program to implement sequential access and random access. Preprocessor directive statements and its usage. Command line argument and its usage.

TEXT BOOK:

1. B.A. Forouzan, "*A Structured programming approach using C,*" Third Edition, Cengage learning.

REFERENCE BOOKS:

1. Herbert Schiltz,"Turbo C/C++ The complete Reference," TataMcGraw-Hill
2. BS Gottrifried, A.Mittal "*Programming in C – A practical approach*," PHI, Tata MC Grawhill.

MCA I-SEMESTER

16MC1HS31: ENGLISH LANGUAGE LABORATORY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: English at Under Graduation level.

COURSE DESCRIPTION:

Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Phonetics
- Information Transfer

CO2. Analyse the functional knowledge in
- Vocabulary
- Grammar

CO3. Design and develop functional skills for professional practice.

CO4. Apply the techniques of Listening and Reading skills to comprehend listening and Reading comprehension.

CO5. Function effectively as an individual and as a member in diverse teams to demonstrate
- Just A Minute
- Role Play

CO6. Communicate effectively in public speaking in formal and informal situations.

CO7. Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

LIST OF EXERCISES:

1. Phonetics
2. Vocabulary Building
3. Functional Grammar
4. Just a Minute
5. Elocution/Impromptu
6. Giving Directions/Conversation Starters
7. Role Play
8. Public Speaking
9. Describing People, Places, Objects and Events.

10. Reading Comprehension
11. Listening Comprehension
12. Information Transfer

Total Lab Slots: 10

REFERENCE BOOKS:

1. D. Sudha Rani, *"A Manual for English Language Laboratories,"* Pearson, Noida, 2010.
2. D. Sudha Rani, *"Advanced Communication Skills Laboratory Manual,"* Pearson, Noida, 2012.
3. R. Manivannan and G. Immanuel, *"Communication Skills Laboratory,"* VK Publications, Sivakasi, 2013
4. Nira Kumar, *"English Language Laboratories,"* PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE:

1. ETNL Language Lab Software Version 4.0
2. GEMS – Globarena E- Mentoring System
3. Speech Solutions
4. English Pronunciation Dictionary by Daniel Jones
5. Learning to Speak English 8.1, The Learning Company – 4 CDs.
6. Mastering English: Grammar, Punctuation and Composition.
7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
8. Dorling Kindersley Series Grammar.
9. Language in Use 1, 2 & 3
10. Cambridge Advanced Learner's Dictionary - 3rd Edition
11. Centronix - Phonetics
12. Let's Talk English, Regional Institute of English South India.
13. The Ultimate English Tutor.

MCA I - Semester

14MC1HS02: PROFESSIONAL COMMUNICATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	1	-	2

PRE-REQUISITES:--

COURSE OBJECTIVES:

I. To lay basic foundation and impart knowledge of English language, grammar and communication skills.
II. To develop listening, speaking, reading and writing skills among students needed in their personal, academic and professional pursuits.
III. To train students apply the nuances of English for various communication needs.
IV. To build confidence in effective usage of English language..

COURSE OUTCOMES:

After the completion of the course, a successful student able to:

1. Acquire fundamental and functional knowledge of English language, grammar and communication skills.
2. Identify and analyze productive skills (speaking and writing) and receptive skills (listening and reading) of English language proficiency for effective communication and practice.
3. Design and develop functional skills for professional practice through English.
4. Communicate effectively with the engineering community and society to comprehend and deliver effective solutions.
5. Inculcate an attitude to upgrade competence of English knowledge and communication to engage in independent and life-long learning.

DETAILED SYLLABUS:-

UNIT – I: IMPORTANCE OF COMMUNICATION (9 PERIODS)

Language as a tool of Communication – Characteristics of Language – Communicative Skills LSRW – Effective Communication – Modes of Communication – Verbal and Non-verbal Communication Barriers to Communication – Objective and Characteristics – Process of Communication – Levels of Communication – Visual Aids.

UNIT – II: ACTIVE LISTENING (8 PERIODS)

Introduction – Importance of Listening and Empathy – Reasons for poor Listening – Traits of a Good Listener – Listening Modes – Types of Listening – Barriers to Effective Listening – Listening and Note-taking.

UNIT – III: EFFECTIVE SPEAKING (8 PERIODS)

Introduction – Achieving Confidence, Clarity, and Fluency – Paralinguistic Features – Types of Speaking – Barriers to Speaking.

UNIT – IV: READING TECHNIQUES (9 PERIODS)

Introduction – Improving Comprehension Skills – Techniques for Good Comprehension – General Kitchen Layout – Predicting the Content – Understanding the Gist – SQ3R Reading Technique – Study Skills.

UNIT – V: TECHNICAL WRITING (8 PERIODS)

Introduction – Importance – Characteristics – Audience Recognition / Analysis – Language – Elements of Style – Techniques for Good Technical Writing – Avoiding Plagiarism – Referencing and Styling.

TOTAL PERIODS: 42

TEXT BOOK

1. Meenakshi Raman and Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, Second edition , 2011.

REFERENCES

1. Sunitha Mishra, C. Muralikrishna, *Communication Skills for Engineers,* Pearson Education, Delhi, 2012.
2. Kavitha Tyagi & Padma Misra, *Professional Communication,* PHI Learning Private Limited, New Delhi, 2011.
3. Alok Jain, Pravin S. R. Bhatia & A. M. Sheikh, *Professional Communication Skills,* S. Chand & Company Ltd, New Delhi, 2008.
4. Rajendra Pal and J. S. Korlahalli, *Essentials of Business Communication*, Sultan Chand & Sons, Delhi, 2012.

MCA I-SEMESTER

16MC10131: IT LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: --

COURSE DESCRIPTION:

Peripherals of a computer and disassembling & assembling the PC; Linux file system and File handling utilities & Text processing utilities; Productivity tools including Word, Excel, Power Point, Access, publisher.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire skills in:

- Identification of Functional parts of PC
- Operating Systems

CO2. Identify the appropriate features to design documents, excel spread sheets and power point presentations.

CO3. Design documents, excel spread sheets, power point presentations, Access database and personal websites effectively.

CO4. Update knowledge and skills in PC maintenance and usage of latest Operating Systems and MS-Office.

CO5. Practice of ethical code of conduct in the usage of computer hardware and software.

CO6. Engage in life-long learning and attitude to work in teams.

CO7. Work together to customize the existing tools.

LIST OF EXERCISES

PC Hardware

1. Identify the peripherals of a computer, components in a CPU and its functions. Block diagram of CPU along with the configuration of each peripheral.
2. Demonstrating disassembling and assembling the PC back to working condition.
3. Introduction to Operating Systems, important of Operating System, components of OS, Installation of Microsoft Windows-XP Operating Systems.
4. Basic MS-DOS commands – Internal and External Commands.

5. Introduction to Linux file system, perform File handling utilities and Text processing utilities.

6. Introduction to Linux - vi editor and Shell Script

7. a) Write a shell Script to generate Fibonacci series.

b) Write a Shell Script to find factorial of a given number.

MS-Office

MS Word

8. a) Design a visiting card in MS-Word (2''x3.5").

b) Perform Mail merge in MS-Word.

MS Excel

9. a) Create a spreadsheet for generating student mark list.

b) Create a spreadsheet for generating all charts

c) Import external data to Ms-excel, perform sorting and filter operations on that data.

MS Power Point

10.a) Create text and images with effects.

b) Prepare a power point presentation on department of MCA which includes Animations, design, sound effects and images.

MS Access

11. Create Access database which consists of at least 3 tables

12. Perform Queries, form design and Reports on above tables.

MS Publisher

13. Create a website using the features**:** Home page, About us, Department, Contact page etc.

REFERENCE BOOKS:

1. ITL Education, *"Introduction to Information Technology,"* Pearson, 2nd Edition, 2005.
2. John Walken bach, *"Microsoft Office 2010 Bible,"* Wiley India Pvt. Ltd, 2010.
3. Peter Norton, *"Introduction to Computers,"* Tata McGraw-Hill, 7th edition, New Delhi 2012.
4. Vikas Gupta, *"Comdex Information Technology Course Tool Kit,"* WILEY Dreamtech, 2nd edition, New Delhi 2006.
5. Sumitabha Das, *"UNIX Concepts and Applications,"* 4th Edition, TMH, 2008.

MCA I-Semester

14MC10122: IT & MANAGEMENT LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES:--

COURSE OBJECTIVES:

I. To train the student on:
   i. Identification of Functional parts of PC
   ii. Internet & WWW
   iii. Computer security issues and preventive measures
   iv. Operating Systems
   v. Financial accounting and management

II. To develop skills in assembling and disassembling PC, installation and un-installation of OS, Hardware and Software trouble shooting.

III. To apply knowledge and skills of IT to create word documents, excel spread sheets, power point presentations develop website and maintenance of PC.

COURSE OUTCOMES:

On completion of the course, a successful student will be able to:

1. Acquire skills in:
   i. Identification of Functional parts of PC
   ii. Internet & WWW
   iii. Computer security issues and preventive measures
   iv. Operating Systems
   v. Types of computer networks, connecting PC to the internet, web browsers, search engines, cyber hygiene
2. Design documents, excel spread sheets, power point presentations and personal websites effectively.
3. Update knowledge and skills in PC maintenance and usage of latest Operating Systems and MS-Office.

LIST OF LAB PROGRAMMS

PC Hardware

1. a) Identify the peripherals of a computer, components in a CPU and its functions. Block diagram of CPU along with the configuration of each peripheral.

b) Demonstrating disassembling and assembling the PC back to working condition.

2. a) Introduction to Operating Systems, important of Operating System, components of OS, Installation of Microsoft Windows-XP Operating Systems.

b) Introduction to LINUX OS, Installation of LINUX OS. Basic DOS commands – mkdir, cd, cls, del, copy, attrib, date, path, type, format, exit.

C) **Hardware & Software Troubleshooting:** Diagnosis of PC malfunction, types of faults, common errors and how to fix them. Basic hardware & software troubleshooting steps, PC diagnostic tools

MS-Office

MS Word

3. Introduction to MS Word, importance of Word as Word Processor, overview of toolbars, saving, accessing files, using help and resources.

Create a word document using the features: Formatting fonts, drop cap, applying text effects, using character spacing, borders & shading, inserting headers & footers, using date & time option.

4. a) Create a word document in MS Word using the features: Inserting tables, bullets & numbering, changing text direction, hyperlink, images from files & clipart, drawing toolbar & word art.

b) Create an invitation using Mail Merge in MS Word.

MS Excel

5. Introduction to MS Excel as a Spreadsheet tool, overview of toolbars, accessing, saving excel files, using help and resources.

Create a spreadsheet using the features: Gridlines, format cells, summation, auto fill, formatting text, formulae in excel charts.

6. Create a spreadsheet using the features: Split cells, Sorting, Conditional formatting, freeze panes, pivot tables, data validation.

MS Power Point

7. a) Introduction to MS Power Point, utilities, overview of toolbars, PPT orientation, slide layouts, types of views.

Create a power point presentation using the features: Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows.

b) Create a power point presentation using the features: Auto content wizard, hyperlinks, Inserting images, clip art, audio, video, custom animation, slide hiding, tables and charts.

MS Publisher & World Wide Web

8. Introduction to MS Publisher, overview of toolbars, saving files, templates, layouts.

Create a website using the features: Home page, About us, Department, Contact page etc.

Internet & Computer Security

9. Search Engines & Cyber Hygiene: Introduction to computer networking, Bookmarks, Search toolbars & pop up blockers. Types of search engines & how to use search engines, Awareness of various threats on Internet, types of attacks & how to overcome. Installation of antivirus software, Configuration of personal firewall & Windows update on Computers.

MANAGEMENT LAB:

10. Create a Company in tally covering the different aspects of address, E-mail, tax numbers, Financial Years etc,The nature of the company's are: a) Non-Trading b) Trading c) Manufacturing

11. From the following information create Accounts Groups under suitable Primary Accounts Groups in tally

Bills receivables	Accrued Incomes	Calls – in - Arrears
Prepaid Expenses	Outstanding expenses	Bills payables
Short term investments	Tangible assets	Intangibles assets
Shares on investments	Loans & Advances(Liability	Raw materials
Work – in – Progress	Loans & Advances from subsidiary (Secure.,)	Capital Reserves
Preliminary Expenses (Prim)	Deposits(liabilities)	Unclaimed Dividends

12. From the following information create Accounts Ledgers under suitable Accounts Groups in tally

Petty Cash A/c	Wages A/c	S.B.I A/c
Kishore Capital A/c	Building A/c	Furniture A/c
Good will A/c	Staff Welfare Expenses A/c	Traveling& Conveyance A/c
Salaries Expenses A/c	Trade Expenses A/c	Carriage Inwards Expe., A/c
Fuel & Oils Expenses A/c	Prepaid Insurance A/c	Accrued Wages A/c
A.B Equity Share Investments A/c	Excise Duty A/c	Customs Duty A/c
T.D.S A/c	T.C.S A/c	VAT A/c
Rent Receivable A/c	Provision for Bad debts A/c	Opening Stock A/c
Discount A/c (Cr.)	Land A/c	Office Car A/c
Goods Purchase A/c	Goods Sales A/c	Returns Inwards A/c
Returns Outwards A/c	Carriage Inwards A/c	Carriage Outwards A/c
Kishore Capital Reserve A/c	Plant & Machinery A/c	Provision Taxation A/c
Repairs & Maintenance A/c	Advertisement A/c	Rent Received A/c
Commission A/c (Cr.)	Interest A/c	Outstanding Salaries A/c

Depreciation A/c	Manufacturing Expe,. A/c	Ravi Salary Advance A/c
I.C.I.C.I Secu., Loan A/c	Prasad Unsecu., Loan A/c	Loss on sale of Machinery
Balu Enterprises a/c VJA (Cr.)	Chitra Enterprises A/c (Dr.)	Telephone Deposit A/c
Rent Received in Advance A/c	Bad debts A/c	Bank Charges A/c

13. From the following information create Accounts Ledgers under suitable Accounts Groups in tally **3 Periods**

Petty Cash A/c	Wages A/c	S.B.I A/c
Kishore Capital A/c	Building A/c	Furniture A/c
Good will A/c	Staff Welfare Expenses A/c	Traveling& Conveyance A/c
Salaries Expenses A/c	Trade Expenses A/c	Carriage Inwards Expe., A/c
Fuel & Oils Expenses A/c	Prepaid Insurance A/c	Accrued Wages A/c
A.B Equity Share Investments A/c	Excise Duty A/c	Customs Duty A/c
T.D.S A/c	T.C.S A/c	VAT A/c
Rent Receivable A/c	Provision for Bad debts A/c	Opening Stock A/c
Discount A/c (Cr.)	Land A/c	Office Car A/c
Goods Purchase A/c	Goods Sales A/c	Returns Inwards A/c
Returns Outwards A/c	Carriage Inwards A/c	Carriage Outwards A/c
Kishore Capital Reserve A/c	Plant & Machinery A/c	Provision Taxation A/c
Repairs & Maintenance A/c	Advertisement A/c	Rent Received A/c
Commission A/c (Cr.)	Interest A/c	Outstanding Salaries A/c
Depreciation A/c	Manufacturing Expe,. A/c	Ravi Salary Advance A/c
I.C.I.C.I Secu., Loan A/c	Prasad Unsecu., Loan A/c	Loss on sale of Machinery
Balu Enterprises a/c VJA (Cr.)	Chitra Enterprises A/c (Dr.)	Telephone Deposit A/c
Rent Received in Advance A/c	Bad debts A/c	Bank Charges A/c

14. Journalise from the following transactions in the books of M/s ZXY Ltd, for the month of October, 2006, and also generate the computerized Financial Statements in Tally (**Voucher Entry)**

Date	Transactions	Amounts (Rs.)
1,Oct,2006	Krishna started business with cash	65,000
4	Goods purchased for cash	14,000
5	Deposited into S.B.I, Tirupati	2,400
6	Goods sold for cash	18,000
10	Cash paid to Gopal	1,000
13	Goods purchased for cash	15,000
16	Goods sold to Narayana, Nellore	4,000
19	Purchased Furniture for cash	2,000
20	Received cash from Narayana, Nellore	750
24	Goods purchased from Sridhar, Hyderabad	2,000
28	Cash paid to Sridhar, Hyderabad	2,000
28	Withdrew from S.B.I, Tirupati	1,000
29	Withdrew from S.B.I, Tirupati for personal use	250
30	Paid for stationary	200
31	Paid Rent	500
31	Discount Received	700
31	Paid salaries	3,100

i. Which report will show the financial position of the company
ii. Name any 5 Accounting reports that can be displayed or printed in tally.

15. From the following information create **Inventory** in tally

16. From the following Trial balance of M/s AB&CO., prepare the Final Accounts (Trading and Profit & Loss A/c and also Balance Sheet) on 31st, March, 2010 in Tally

Trial Balance: Debit Balances (Rs.):Srinivasa Drawings Rs.4,500; Purchases Rs.20,000; Returns Inwards Rs.1,500; Stock (1-4-2005) Rs.8,000; Salary Rs.4,200; Wages Rs.1,200; Rent Rs.350; Bad debts Rs.400; Discount Rs.700; Sundry Debtors Rs.14,000; Cash in hand Rs.260; I.C.I.C.I Bank Rs.5,940; Insurance Rs.400; Trade Expenses Rs.300; Printing Rs.150; Furniture Rs.2000; Machinery Rs.5,000:

Credit Balances (Rs.): Srinivasa Capital Rs.24, 000; Sales Rs.30, 500; Discounts Rs.1, 900; Sundry Creditors Rs.10,000; Bills Payable Rs.2,500' **T.B Total :68,900**

Adjustments: 1.Closing stock was valued at Rs.7, 000; 2. Insurance was prepaid to the extent of Rs.60; 3. Outstanding liabilities were salary Rs.200 and wages Rs.200. 4. Make provision for doubtful debts at 5% on Sundry debtors. 5. Calculate interest on capital at

5% p.a. 6. Depreciate machinery at 5% and furniture at 10%. 7. Provide for discount on creditors at 1%

REFERENCE BOOKS:

1. ITL Education, "*Introduction to Information Technology,*" Pearson, 2nd Edition, 2005.
2. John Walken bach, "*Microsoft Office 2010 Bible,*" Wiley India Pvt. Ltd, 2010.
3. Peter Norton, "*Introduction to Computers,*" Tata McGraw-Hill, 7th edition, New Delhi 2012.
4. Vikas Gupta, "*Comdex Information Technology Course Tool Kit,*" WILEY Dreamtech, 2nd edition, New Delhi 2006.

MCA I-SEMESTER

16MC10132: PROGRAMMING IN C LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Programming in C".

COURSE DESCRIPTION:

Program design and problem solving using the C programming language; Programming topics include control structures, functions, arrays, Strings, pointers, and file I/O and the usage of the preprocessor.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Solve problems using knowledge in

- C Tokens
- Input/output Formatting styles
- Control statements
- Data types

CO2. Design and develop the solutions using the techniques-parameter passing mechanism, command line arguments and handling files for real world problems making use of analysis of algorithms and verification.

CO3. Demonstrate the concepts of C as modular programming language which includes functions, pointers and structures to solve real world complex problems.

CO4. Engage lifelong learning and develop programming competency.

LIST OF EXERCISES

1. a) Write an Algorithm and flow chart to read the name and print the name

b) Write an Algorithm and flow chart to add two numbers.

c) Write an Algorithm and a flow chart to calculate area of square.

d) Write Algorithm and flow chart to find the largest of two numbers.

2. a) Write a C Program to find the sum of individual digits of a positive integer.

b) Write a C Program to find the roots of a quadratic equation.

c) Write a C program to read in a three digit number produce following output

(assuming that the input is 347)

3 hundreds

4 tens

7 units

d) Write a program to generate Fibonacci series.

3. Write a C non recursive and recursive function for the following task

a) Calculating Factorial
b) Swapping the values of two variable
c) Minimum/maximum value from the given input
d) Nth Fibonacci number
e) GCD of a Given Number

4. a) Write a C Program to Add, Subtract and Multiply Two Matrices Using Functions (Passing arrays as arguments to the function)

b) Write a C program to determine if the given string is a palindrome or not

5. a) Write a C Program to Insert a Substring into a Given Main String from a given Position.

b) Write a C Program to Delete n Characters from a Given Position in a Give String.

6. a) Write a program to swap two numbers using pointers.

b) Write a program to find sum of given array using pointers.

7. Write a C program that uses functions to perform the following operations:

a) Reading a complex number
b) Writing a complex number
c) Addition of two complex numbers
d) Multiplication of two complex numbers

8. a) Write a C program for Electricity Bill Tacking different categories of users, different slabs in each category. (Using Nested If Else Statement)

b) Write a c program to evaluate the following using loops

i)1+x2/2!+x4/4!+...up to 5 terms

ii) x+x3/3!+x5/5!+...up to 5 terms

9. a) Write a c program to check whether the given number is

i) prime or not

ii) perfect or abundant or deficient

b) Write a c program to find the mean, mode, median, and variance of list of values by using one dimensional array.

10. a) Write a menu driven program to read a list of numbers and perform the following operations

i) print the list

ii) delete duplicates from the list

iii) reverse the list.

b) Write a c program that consists of recursive functions to find

i) factorial of a given number

ii) print the Pascal triangle using binomial theorem.

11. Write a menu driven program to read list of student names and perform the following operations using array of character pointers. a) to insert a student name

b) to delete a name

c) to print the names.

12. a) Write a C program which copies one file to another.

b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

13. a) Write a C program to display the contents of a file.

b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

REFERENCE BOOKS

1. BS Gottrifried, A.Mittal, *"Programming in C – A practical approach,"* PHI, Tata MC Grawhill, 2008.
2. M.T. Somashekara, *"Problem Solving with C",* PHI Learning Private Limited: New Delhi, 2012.

MCA I - Semester

14MC10121: PROGRAMMING IN C AND DATA STRUCTURES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES:--

COURSE OBJECTIVES:

I. To understand various steps involved in Program development and basic concepts in C Programming Language.
II. To design and implement basic and advanced data structures like stacks, Queues and Trees.
III. To develop Programs using C and Data Structures.

COURSE OUTCOMES:

After the completion of the course, a successful student able to:

1. Understand the usage of C language features and data structures.
2. Analyze to solve problems using various data structures like linear list, stack, queue, trees.
3. Develop, execute and document solution for various problems using the features of C language.
4. Handle operations like, insertion, deletion, sorting and searching mechanism on various data structures.
5. Emphasize the programming concepts, how they work together which would be learning through meaning full examples.

LIST OF LAB PROGRAMMS

1. a) Write an Algorithm and flow chart to read the name and print the name
   b) Write an Algorithm and flow chart to add two numbers.
   c) Write an Algorithm and a flow chart to calculate area of square.
   d) Write Algorithm and flow chart to find the largest of two numbers.

2. a) Write a C Program to find the sum of individual digits of a positive integer.
   b) Write a C Program to find the roots of a quadratic equation.

   c) Write a C program to read in a three digit number produce following output

      (assuming that the input is 347)

      3 hundreds

      4 tens

      7 units

   d) Write a program to generate Fibonacci series

3. a) Write a C non recursive and recursive function for the following task

      i. Calculating Factorial

ii. Swapping the values of two variable

iii. Minimum/maximum value from the given input

iv. Nth Fibonacci number

v. GCD of a Given Number

b) Write a C Program to Add, Subtract and Multiply Two Matrices Using Functions (Passing arrays as arguments to the function)

c) Write a C program to determine if the given string is a palindrome or not

4. a) Write a C Program to Insert a Substring into a Given Main String from a Given Position

b) Write a C Program to Delete n Characters from a Given Position in a Give String

5. a) Write a program to swap two numbers using pointers.

b) Write a program to find sum of given array using pointers

6. a) Write a C program which copies one file to another.

b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

7. a) Write a C program to display the contents of a file.

b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

8. Write a C program that uses functions to perform the following operations:

i) Reading a complex number

ii) Writing a complex number

iii) Addition of two complex numbers

iv) Multiplication of two complex numbers

9. Write a C program that uses Stack operations to perform the following:

i) Converting infix expression into postfix expression
ii) Evaluating the postfix expression

10. Write a C program that uses functions to perform the following operations on single linked list:
i) Creation ii) Insertion iii) Deletion iv) Traversal

11. Write a C program that uses functions to perform the following operations on double linked list

i) Creation ii) Insertion iii) Deletion iv) Traversal

12. Write a C program that uses functions to perform the following operations on Circular linked list
    i) Creation ii) Insertion iii) Deletion iv) Traversal

13. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
    i) Bubble sort ii) Selection sort

14. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
    i) Quick sort ii) Merge sort

15. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
    i) Linear search ii) Binary search

16. Write a C program that implements stack (its operations) using a singly linked list to display a given list of integers in reverse order. Ex. input: 10 23 4 6 output: 6 4 23 1

REFERENCE BOOKS:

1. P. Padmanabham, *"C programming and Data Structures"* , 3rd Edition, BS Publications
2. M.T. Somashekara, *"Problem Solving with C"*, PHI Learning Private Limited: New Delhi, 2012.
3. E. Karthikeyan, *"A Textbook on C Fundamentals, Data Structures and Problem Solving*," Prentice Hall of India Private Limited: New Delhi, 2008.

MCA – II SEMESTER

16MC20101: DATABASE MANAGEMENT SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: --

COURSE DESCRIPTION:

Concepts of relational database and its design; Representation of ER diagram to Relational model; SQL queries; Normal forms; Recovery and concurrency control mechanism, Storage and indexing mechanism.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Gain in-depth knowledge in

- Database models and database architecture
- Transaction processing and recovery management
- Storage and Indexing mechanism

CO2. Analyze the complex problems of real world applications.

CO3. Design Relational Database Schema for a given Entity Relationship model.

CO4. Interpret the data by applying normalization techniques for the development of database application projects.

CO5. Use Structured Query Language DDL/DML/DCL commands to solve real time applications.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO CONCEPTUAL MODELING AND DATABASE DESIGN

(11 Periods)

Introduction and Conceptual Modeling:

Database System Applications, database systems versus file systems, view of data: data abstraction, instances and schemas, data models: the entity-relationship model, relational models and other data models, database languages, database users and administrators, database system structure, history of database systems

Introduction to Database design: Database design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model.

UNIT – II RELATIONAL MODEL AND BASIC SQL (10 Periods)

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /altering Tables and Views.

Case Study: ER diagram for banking enterprise and university database

Basic SQL: SQL data definition and data types - CREATE table command in SQL, attribute data types in SQL, Specifying constraints in SQL- specifying attribute constraints and attribute defaults, specifying key and referential integrity constraints, specifying constraints on tuples using CKECK.

UNIT – III: SQL AND SCHEMA REFINEMENT AND NORMAL FORMS (12 Periods)

SQL : Form of Basic SQL Query- Examples of Basic SQL Queries, Introduction to Nested Queries, correlated Nested Queries, Set- Comparison Operators, Aggregate Operators, NULL values-Comparison using Null values- Logical connectives- AND, OR and NOT- Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Triggers and Active Databases.

Schema Refinement and Normal Forms: Introduction to Schema Refinement- Problems Caused by redundancy, Decompositions, Problem related to decomposition, Functional Dependencies, Normal Forms – FIRST, SECOND, THIRD Normal forms, BCNF, Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition.

UNIT - IV: OVERVIEW OF TRANSACTION MANAGEMENT, CRASH RECOVERY AND CONCURRENCY CONTROL (11 Periods)

Overview of Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock Based Concurrency Control, Performance of Locking.

Concurrency Control: 2PL, Serializability and recoverability, Introduction to Lock Management, Lock Conversions.

Crash recovery: Introduction to ARIES, the Log, Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash.

UNIT - V: OVERVIEW OF STORAGE AND INDEXING (11 Periods)

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index Data Structures- Hash based Indexing, Tree based Indexing.

Storing Data: The Memory Hierarchy- Magnetic disks, Performance implications of disk structure; Redundant Arrays of Independent Disks.

Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Total Periods: 55

TEXT BOOKS

1. Raghu Ramakrishnan and Johannes Gehrke, "Data base Management Systems," Tata McGraw-Hill, 3rd Edition, 2007.
2. RamezElmasri, Shamkant B. Navathe, "Database Systems," Pearson Education, 6th Edition, 2013.

REFERENCE BOOKS

1. A.Silberschatz, H.F. Korth, S.Sudarshan, "Data base System Concepts," McGraw hill, 6th edition, 2006.
2. C. J. Date, "Introduction to Database Systems," Pearson Education, 7th Edition, 2004.
3. M. L. Gillenson, "Fundamentals of Database Management Systems," Wiley Student Edition, 2nd Edition, 2012.
4. Peter Rob and Carlos Coronel, "Database Systems Design, Implementation and Management," Cengage Learning, 8th Edition, 2009.

MCA II- Semester

14MC20103: DATABASE MANAGEMENT SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

PRE-REQUISITES:--

COURSE OBJECTIVES:

I. To offer basic knowledge in the design and implementation of database system.
II. To be aware of database concepts such as integrity constraints, concurrency control and recovery management.
III. To develop skills in querying, updating and managing the database system.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Apply knowledge of transactional processing system for recovering system from crash.
2. Identify normalization techniques for the development of software applications to realistic problems.
3. Design an application system using Entity-Relationship(ER) diagrams.
4. Learn and apply Structured Query Language (SQL) for database definition and manipulation.

DETAILED SYLLABUS

UNIT- I: INTRODUCTION TO CONCEPTUAL MODELLING, DATABASE CONCEPTS AND ARCHITECTURE (10 Periods)

Introduction and Conceptual Modeling: **Databases and Database Users:** Introduction, Characteristics of Database Approach, Actors on the Scene, Workers defining the Scene, Advantages of using DBMS Approach.
Database System-Concepts and Architecture: Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database Language and Interfaces, The Database System Environment- DBMS component modules, database system utilities, Tools, application environments and communication facilities.

UNIT- II: INTRODUCTION TO DATABASE DESIGN AND RELATIONAL MODEL (12 Periods)

Introduction to Database design: Database design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises
Relational Model: Introduction to the Relational Model – Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /altering Tables and Views.

UNIT – III: BASIC SQL QUERY & INTRODUCTION TO SCHEMA REFINEMENT (12 Periods)

Form of Basic SQL Query: Examples of Basic SQL Queries, Nested queries: Introduction to Nested Queries, Correlated Nested Queries, Set – Comparison Operators, Aggregate Operators, NULL values :Comparison using Null values – Logical connectives – AND, OR and

NOT – Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL, Triggers and Active Data bases.
Introduction to Schema Refinement: Problems Caused by redundancy, Decompositions, Problem related to decomposition, Functional Dependencies, Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition.

UNIT- IV: OVERVIEW OF TRANSACTION MANAGEMENT, CRASH RECOVERY AND CONCURRENCY CONTROL (11 Periods)

Overview of Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Performance of Locking.

Crash recovery: Introduction to ARIES, the Log, Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery.
Concurrency Control: 2PL, Serializability and recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks.

UNIT V: OVERVIEW OF STORAGE AND INDEXING (10 Periods)

Overview of Storage & Indexing: Data on External Storage – File Organization & Indexing – Index Data Structures.
Storing Data: The Memory Hierarchy: Magnetic disks, Performance implications of disk structure - Redundant Arrays of Independent Disks.
Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TOTAL PERIODS: 55

TEXT BOOKS:

1. Raghu Ramakrishnan and Johannes Gehrke , "*Data base Management Systems*," 3rd Edition, Tata McGraw-Hill,2003.
2. Ramez Elmasri, Shamkant B. Navathe, Durvasula V.L.N. Somayajulu and Shyam K. Gupta, "*Fundamentals of Database Systems*," 4th edition, Pearson education, 2008.

REFERENCE BOOKS:

1. A.Silberschatz,H.F. Korth, S.Sudarshan, "*Data base System Concepts*," McGraw hill, VIth edition,2006.
2. C.J.Date, "*Introduction to Database Systems*," Pearson Education, 7th edition,2004.
3. M. L. Gillenson, "*Fundamentals of Database Management Systems*," Wiley Student Edition.
4. Peter Rob, A. Ananda Rao and Carlos Coronel, "*Database Management Systems*," Cengage Learning, 2008.

MCA II-SEMESTER

16MC20104: SOFTWARE ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:- -

COURSE DESCRIPTION:

Software engineering core principles process models and agile process; design concepts and design issues; quality management principles; software configuration and product metrics; project estimation and risk management maintenance.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Understand concepts-process, models, methodologies and principles of software engineering.

CO2. Identify and classify user requirements and software requirement specification.

CO3. Analyze the architecture and Design application software using design engineering principles.

CO4. Estimate and maintain software configuration management by synthesis of development process to provide valid conclusions.

CO5. Apply risk and metrics management principles for quality assurance.

CO6. Test and communicate quality of an application and as per needs of the stakeholder.

DETAILED SYLLABUS:

UNIT - I: SOFTWARE PROCESS AND SOFTWARE PRINCIPLES (12 periods)

The nature of Software , Software Myths, **Software Process Models:** A Generic Process Model, Process Models, **Core Principles** - Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles.

Understanding Requirements: Requirements Engineering, Eliciting Requirements, Functional and non functional Requirements, Developing Use Cases, Validating Requirements, Introduction to Agile Processes - extreme Programming.

UNIT - II: SOFTWARE DESIGN AND SOFTWARE ARCHITECTURE (12 periods)

Design concepts - Abstraction - Modularity - Refinement - **Architectural design** - Software Architecture, Architecture Design, Architecture Style, Architectural Mapping Using

Data Flow. **Component Level Design:** Component, Component Based Development. **User Interface Design:** The Golden Rules, Interface analysis and design, Interface design steps, Design Evaluation. **Web App Design:** Aesthetic, Content, Architecture, Navigation and Component level Design - Design issues.

UNIT - III: QUALITY MANAGEMENT PRINCIPLES (11 periods)

Quality, Quality Control, Quality Assurance, **Review Techniques**-Informal Reviews, Formal Technical Reviews, Software Testing strategies, Unit Testing, Integration Testing, System Testing, Debugging Process, - Equivalence class Partitioning (ECP) , Boundary Value Analysis(BVA), White Box Testing, Black Box Testing. **Testing Web Applications:** Content, User Interface, Navigation, Configuration, Security and Performance Testing.

UNIT - IV: SOFTWARE CONFIGURATION MANAGEMENT AND PROJECT METRICS (10 periods)

Software Configuration Management, **The SCM process:** Identification of objects, Version Control - Change control, Content Management, Change Management. **Software measurement** - - Size-oriented metrics and function point metrics .Object oriented Metrics, Use Case Oriented Metrics

UNIT V – PROJECT ESTIMATION, RISK MANAGEMENT AND MAINTENANCE (10 periods)

Software Sizing, Problem Based Estimation Process Based Estimation, Estimation with Use Cases. Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Monitoring and Management, RMMM Plan. Software Maintenance , Software Supportability, Software Reengineering - Software reengineering process model - Reverse engineering to understand data, and processing

Total Periods: 55

TEXT BOOKS

1. Roger S. Pressman, "Software Engineering, A practitioner's Approach", McGraw-Hill International Edition, 7th edition, 2010.

REFERENCE BOOKS

1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International Publishers, 3rd edition, 2007.
2. Shely Cashman Rosenblatt, "Systems Analysis and Design", Thomson Publications, 6th edition, 2006.

MCA II - Semester

14MC20104: SOFTWARE ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

PRE-REQUISITES:--

COURSE OBJECTIVES:

1. To understand the importance of software engineering process and total quality management during the development of application software.
2. To enhance the development of software application by focusing on Agile Development, Architectural Design**,** COCOMO, Software Testing and Risk Management.
3. To provide a road-map for the development team and end-users of an application software.

COURSE OUTCOMES:

After completion of the course, a successful student able to:

1. Understand the different Software models and basic concepts of a Software Engineering.
2. Formulate and solve various problems by adopting appropriate methods like requirements elicitation and analysis, COCOMO, RMMM Plan during the development of application software.
3. Design and develop a component/ an entire application software by making use of Agile process Model.
4. Demonstrate the knowledge of understanding by making use of an appropriate process model for the development of application software.
5. Communicate effectively with all the stakeholders of software systems function appropriately on multi-disciplinary teams.
6. Improve the software quality and software testing methodologies.

DETAILED SYALLABUS:-

UNIT-I: SOFTWARE, SOFTWARE ENGINEERING, AND PROCESS (10 periods)

The nature of Software, The unique nature of WebApps, Software engineering- A layered technology, A Generic process model , Process assessment and improvement, Forward Engineering , Reengineering, Reverse Engineering , CMMI, Software myths.

UNIT-II: PROCESS MODELS AND SOFTWARE REQUIREMENTS (13 periods)

Process Models: Prescriptive process models: The waterfall model, Incremental Process Model: The RAD Model. Evolutionary process models: Prototyping, The Spiral Model , The Unified Process; Phases of the Unified Process, agile development: Agile process, extreme programming. The Unified process, Scrum process.

Software Requirements: Introduction to functional and non-functional requirements, User requirements, System requirements, Interface specifications, the software requirement document, Requirements elicitation and analysis.

UNIT-III: ANALYSIS AND DESIGN MODEL (10 periods)

Analysis Concepts: Data Dictionary, Entity-Relationship Diagrams, Data Flow Diagrams.

Design Concepts: Software design quality guidelines and attributes, Design model.

Architectural Design: Architecture and its importance, Architectural Styles, Architectural design, Architectural mapping using data flow.

UNIT-IV: PERFORMING USER INTERFACE DESIGN AND SOFTWARE TESTING

(10 periods)

Performing User Interface Design: Golden rules, User interface analysis and design, interface analysis, interface design steps.

Self Directed Learning: Designing of a Screen Mock for Student Information System.

Software testing strategies: Software testing fundamentals, A strategic approach to software testing, Test strategies: Unit testing and integration testing, System Testing and User Acceptance Testing (UAT)), Design test cases.

UNIT-V: RISK MANAGEMENT, MAINTENANCE, RE-ENGINEERING AND ESTIMATION
(9 periods)

Risk management: Reactive versus Proactive Risk strategies, RMMMPlan.

Maintenance and reengineering: Software maintenance, software supportability, reengineering.

Empirical Estimation Models: Structure of Estimation Models, COnstructiveCOstMOdel, Software Equation.

TOTAL PERIODS: 52

TEXT BOOKS:

1. Roger S. Pressman, *"Software Engineering A practitioner's Approach*," 7th Edition, McGraw-Hill,2010.
2. Sommerville, *"Software Engineering*," 8th Edition,Pearson education, 2007.

REFERENCE BOOK:

1. K.K. Agarwal and YogeshSingh*, "Software Engineering,"* New Age International Publishers.

MCA II-SEMESTER

16MC20131: DATABASE MANAGEMENT SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:A Course on "Database Management Systems".

COURSE DESCRIPTION:

Analyze problems and design of ER diagrams; Creation of Data Definition commands; Normalization techniques; Implementation of functions; Creation of Views, Indexes and Sequences; Implementation of simple and complex queries using Oracle SQL; Creation of packages and triggers.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Impart knowledge in applying normalization techniques for development of application software to realistic problems.

CO2. Formulate queries using SQL DDL/DML/DCL commands.

CO3. Design a database using ER diagrams, convert ER diagrams into relation schemas.

CO4. Improve the database performance by optimizing the queries using Indexing and Hashing techniques.

CO5. Exploit their knowledge in developing database applications using SQL language.

LIST OF EXERCISES

1. **Creation of DDL Commands**
   Using SQL, create simple DDL Commands (CREATE, ALTER, DROP, RENAME, TRUNCATE) on the following schema of tables.
   EMP (Empno number (5), Ename varchar2 (20), Sal number (8, 2), Designation varchar2 (20), Address varchar2 (20))
   DEPT (Deptno number (3), Dname varchar2 (20), Location varchar2 (25))
2. **Creation of DML Commands**
   Implement various DML commands and execute simple SQL queries.
3. **Creation of Table level and Column level Constraints**
   Implement table level and column level constraints like Domain Integrity constraints (NOT NULL, CHECK), Entity integrity constraints (UNIQUE, PRIMARRY KEY) and Referential integrity constraints (FOREIGN KEY).
4. **Retrieving of data using comparison operators and logical operators**
   Practice of simple SQL queries using comparison operators (=, !=, >, <, >=, <=, <>, between, in, not in, null) and logical operators(and, or, not).
5. **ER diagram for an University database**
   Construct an ER diagram for a University database application. Identify the Relations and include necessary integrity constraints.
   An University has many departments, where each department has multiple Instructors. An Instructor belongs to only one department. Each department offers multiple Courses, each of which is taught by a single Instructor. A student may enroll for many courses offered by the department.
   Implement the following queries:
   i. Find the names of all the students whose total credits are greater than 100
   ii. Find the course-id and grades of all courses taken by any student named 'Tanaka'
   iii. Find the ID and name of instructors who have taught a course in the Computer Science department.
   iv. Find the courses which are offered in both 'Fall' and 'Spring' semester (not necessarily in the same year).
   v. Find the names of all the instructors from Computer Science department.

vi. Find the course-id and titles of all courses taught by an instructor named 'Srinivasan'

vii. Find names of instructors who have taught at least one course in Spring 2009

6. Single Row Functions

Implement queries using Single row functions such as Numeric functions, Date functions, Conversion functions and String functions.

7. Group functions

Practice Group functions such as Sum, Avg, Max, Min, Count.

8. Group by Having Clause

Implement SQL queries using Group By and Having Clause.

9. Creation of VIEWS

Creation of tables using Simple View and Complex View

10. Synonym and Sequences

Implementation of Synonym and Sequences.

11. JOINS

Practice queries using JOINS and OUTER JOINS.

12. SUBQUERIES

Implementation queries using SUBQUERIES.

13. PL/SQL basic programs

a) Write a simple PL/SQL program to accept a number from user and test whether it is divisible by a number

b) Write a PL/SQL program to check whether the input is a character, number or a special character.

c) Write a PL/SQL code to update the salary of an employee based on given bonus and department number.

14. PL/SQL CURSOR programs

Write a PL/SQL program for generation of Electricity Bill using CURSORS.

Create a table for Electricity bill consists of Customer_no, Customer_name, Customer_type, Prev_met_read, Curr_met_read, Month_name. Assume there are three Customer types namely Industrial, Agriculture and Domestic. Calculate the total charges based on the type of customer.

15. Triggers

Generate a database trigger to update the salary of an employee before/after performing any DML operations.

16. Procedures

Write a procedure which takes the department_id as an input parameter and lists the names of all employees belonging to that department.

17. Functions

Write a Pl/Sql block of code that lists the highest salary drawn by an employee in each of the departments. It should make use of a function dept_highest which return the highest salary drawn by an employee for the given department.

18. Packages

Create a package to find the salary of an Employee by providing employee_id as an argument.

REFERENCE BOOKS

1. Ivan Bayross, *"SQL, PL/SQL The Programming Language of ORACLE,"* BPB Publications, 2002.
2. Dr. P. S. Deshpande, *"SQL & PL/SQL for Oracle 10g Black Book,"* Dreamtech Press, 2007.
3. J. J. Patrick, *"SQL Fundamentals,"* Pearson Education, 2nd Edition, 2002.
4. Rick F. Vander Lans,*"Introduction to SQL,"* Addison-Wesley Professional, 4th Edition, 2007.

MCA II-Semester
14MC20122: DATABASE MANAGEMENT SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES:--

COURSE OBJECTIVES:

I. To provide basic knowledge in the design and implementation of database schema for a given problem.
II. To be aware of database concepts such as entity integrity constraints, domain integrity constraints, referential integrity constraints etc.,
III. To develop skills in querying, updating and managing the database system.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Impart knowledge in applying normalization techniques for development of application software to realistic problems.
2. Formulate queries using SQL DDL/DML/DCL commands.
3. Design a database using ER diagrams, convert ER diagrams into relation schemas.
4. Exploit their knowledge in developing database applications using SQL language.
5. Implement procedural programming using PL/SQL language.

LIST OF LAB PROGRAMMS

1. Analyze the problem carefully and come up with the entities in it. Identify what data has to be persisted in the database. This contains the entities, attributes etc.Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, foreign keys and if any.
2. Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total / partial). Try to incorporate generalization, aggregation, specialization etc wherever required.

3. Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion. There are different ways of representing relationships as tables based on the cardinality. Represent attributes as columns in tables or as tables based on the requirement. Different types of attributes (Composite, Multivalued, and Derived) have different way of representation.

4. Creation of tables, altering the tables, dropping tables truncate and rename tables etc.

5. Database normalization is a technique for designing relational database tables to minimize duplication of information and, in so doing, to safeguard the database against certain types of logical or structural problems, namely data anomalies.

   For example, when multiple instances of a given piece of information occur in a table, the possibility exists that these instances will not be kept consistent when the

data within the table is updated, leading to a loss of data integrity. A table that is sufficiently normalized is less vulnerable to problems of this kind, because its structure reflects the basic assumptions for when multiple instances of the same information should be represented by a single instance only

6. Work on simple queries to access data from tables using SELECT statement and WHERE condition. Also perform insert, update, delete and retrieve data from the database.

7. Practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING clauses.

8. Practice String functions: Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr **Datefunctions:** Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round **Conversion functions:** To_char, to_number and to_date.

9. Practice queries on Defining Views, Creating Views, Using Views to Change Data, Dropping Views, creating Indexes and sequences.

10. Practice queries (along with sub queries) using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

11. Practice queries using Joins (equi joins, non equi-joins, outer joins: Left outer joins, Right outer joins etc.,)

12. a) Creation of simple PL/SQL program using declaration, executable and exception handling sections.

    b) Creation of PL/SQL programs using Cursors.

13. Work on Triggers. Creation of insert trigger, delete trigger, update trigger. Practice triggers using the above database.

14. Learn the procedure for creating packages and develop applications that reference its types, call its subprograms, use its cursor, and raise its exception.

REFERENCE BOOKS:

1. Dr. P. S. Deshpande, "*SQL & PL/SQL for Oracle 10g Black Book*," Dreamtech Press,2007.
2. Ivan Bayross, "*SQL, PL/SQL The Programming Language of ORACLE,*" BPB Publications, 2002.
3. J. J. Patrick, "*SQL Fundamentals*,"2nd edition, Pearson Education, 2002.
4. Rick F. Vander Lans, "*Introduction to SQL*," 4th edition, Addison-Wesley Professional, 2007.

MCA II-SEMESTER
16MC20132: DATA STRUCTURES THROUGH C LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Programming in C Lab" and "Data Structures".

COURSE DESCRIPTION

Implementing logical and physical representation of data, complexity and their efficiency. Implementing linked lists and their different variations, queues, stacks and their applications; tree structures and their different variations; Solving problems using graphs, sorting and searching techniques.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Apply abstract data type and their basic usability in different applications through C programming language.
CO2. Identify and analyze suitable data structures to solve computing problems.
CO3. Design and develop variety of c programs using data structures in order to solve computing problems.
CO4. Choose the appropriate data structure and algorithm design method to get an optimal solution for complex real world problem.
CO5. Apply searching, sorting, tree traversal and graph traversal techniques to optimize the complexities of an application.
CO6. Work together or as an individual to customize the applications.

LIST OF EXERCISES:

1. Write C programs that implement stack and its operations using
   a) Arrays b) Pointers
2. Write C programs that uses Stack operations to perform the following:
   a) Converting infix expression into postfix expression
   b) Evaluating the postfix expression
3. Write C programs that implement Queue and its operations using
   a) Arrays b) Pointers
4. Write a C program that uses functions to perform the following operations on single linked list:
   i) Creation ii) Insertion
   iii) Deletion iv) Traversal
5. Write a C program that uses functions to perform the following operations on double linked list
   i) Creation ii) Insertion
   iii) Deletion iv) Traversal
6. Write a C program that uses functions to perform the following operations on Circular linked list
   i) Creation ii) Insertion
   iii) Deletion iv) Traversal
7. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Bubble sort ii) Selection sort
8. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Quick sort ii) Merge sort
9. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:

i) Linear search ii) Binary search

10. Write a C program to create Binary Search Tree and perform operations on it.
11. a) Write a C program to implement recursive Tree traversal techniques.
    b) Write a C program to implement non-recursive Tree traversal techniques.
12. Write a C program to create AVL-tree and perform operations on it.
13. Write a C program to implement Heap Sort.
14. Write a C program to implement Graph traversal Techniques (BFS, DFS)
15. Write a C Program to implement Prim's Algorithm.

REFERENCE BOOKS

1. P. Padmanabham, "*C programming and Data Structures,"* BS Publications, 3rd Edition, 2008.
2. M.T. Somashekara, "Problem Solving with C", PHI Learning Private Limited: New Delhi, 2012.
3. E. Karthikeyan, "A Textbook on C Fundamentals, Data Structures and Problem Solving," Prentice Hall of India Private Limited: New Delhi, 2008.

MCA I - Semester

14MC10121: PROGRAMMING IN C AND DATA STRUCTURES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES:--

COURSE OBJECTIVES:

I. To understand various steps involved in Program development and basic concepts in C Programming Language.
II. To design and implement basic and advanced data structures like stacks, Queues and Trees.
III. To develop Programs using C and Data Structures.

COURSE OUTCOMES:

After the completion of the course, a successful student able to:

1. Understand the usage of C language features and data structures.
2. Analyze to solve problems using various data structures like linear list, stack, queue, trees.
3. Develop, execute and document solution for various problems using the features of C language.
4. Handle operations like, insertion, deletion, sorting and searching mechanism on various data structures.
5. Emphasize the programming concepts, how they work together which would be learning through meaning full examples.

LIST OF LAB PROGRAMMS

1. a) Write an Algorithm and flow chart to read the name and print the name
   b) Write an Algorithm and flow chart to add two numbers.
   c) Write an Algorithm and a flow chart to calculate area of square.
   d) Write Algorithm and flow chart to find the largest of two numbers.

2. a) Write a C Program to find the sum of individual digits of a positive integer.
   b) Write a C Program to find the roots of a quadratic equation.

   c) Write a C program to read in a three digit number produce following output

      (assuming that the input is 347)

      3 hundreds

      4 tens

      7 units

   d) Write a program to generate Fibonacci series

3. a) Write a C non recursive and recursive function for the following task

   i. Calculating Factorial

   ii. Swapping the values of two variable

   iii. Minimum/maximum value from the given input

   iv. Nth Fibonacci number

   v. GCD of a Given Number

   b) Write a C Program to Add, Subtract and Multiply Two Matrices Using Functions (Passing arrays as arguments to the function)

   c) Write a C program to determine if the given string is a palindrome or not

4. a) Write a C Program to Insert a Substring into a Given Main String from a Given Position

   b) Write a C Program to Delete n Characters from a Given Position in a Give String

5. a) Write a program to swap two numbers using pointers.

   b) Write a program to find sum of given array using pointers

6. a) Write a C program which copies one file to another.

   b) Write a C program to reverse the first n characters in a file.

   (Note: The file name and n are specified on the command line.)

7. a) Write a C program to display the contents of a file.

   b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

8. Write a C program that uses functions to perform the following operations:

   i) Reading a complex number

   ii) Writing a complex number

   iii) Addition of two complex numbers

   iv) Multiplication of two complex numbers

9. Write a C program that uses Stack operations to perform the following:

   i) Converting infix expression into postfix expression
   ii) Evaluating the postfix expression

10. Write a C program that uses functions to perform the following operations on Single linked list:

i) Creation ii) Insertion iii) Deletion iv) Traversal

11. Write a C program that uses functions to perform the following operations on double linked list
    i) Creation ii) Insertion iii) Deletion iv) Traversal

12. Write a C program that uses functions to perform the following operations on Circular linked list
    i) Creation ii) Insertion iii) Deletion iv) Traversal

13. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
    i) Bubble sort ii) Selection sort

14. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
    i) Quick sort ii) Merge sort

15. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
    i) Linear search ii) Binary search

16. Write a C program that implements stack (its operations) using a singly linked list to display a given list of integers in reverse order. Ex. input: 10 23 4 6 output: 6 4 23 1

REFERENCE BOOKS:

1. P. Padmanabham, *"C programming and Data Structures"* , Third Edition, BS Publications
2. M.T. Somashekara, "*Problem Solving with C"*, PHI Learning Private Limited: New Delhi, 2012.
3. E. Karthikeyan, *"A Textbook on C Fundamentals, Data Structures and Problem Solving*," Prentice Hall of India Private Limited: New Delhi, 2008.

MCA -III Semester

(16MC3HS01): ORGANIZATIONAL BEHAVIOR AND HUMAN RESOURCE MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE REQUISITE: --

COURSE DESCRIPTION : Managements; Functions of Management; Elements of Corporate Planning Process; Environmental Analysis; Management of Change; Organizational Behavior; Individual Behavior; Concepts of Personality; Perception; Learning; HRM; Human Resource Planning; Job Design and Job Design; Recruitment; Selection; Training; BPO.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on managing behavior in an organization.

CO2. Develop requisite skills for:

CO3. Effective Human Resource Management.

CO4. Optimum utilization of Human Resource.

CO5. Develops effective communication among the work group of an organization.

CO6. Provide life-long learning for effective operation of an organization.

DETAILED SYLLABUS:-

UNIT–I: INTRODUCTION TO MANAGEMENT (11 Periods)

Concepts of Management and organization- Nature and Importance of Management, Functions of Management, Systems Approach to Management, managerial skills.

UNIT-II: ORGANIZATIONAL AND INDIVIDUAL BEHAVIOUR (11 Periods)

Concept and meaning of Organizational Behavior(OB), characteristics of OB, Individual Behavior and individual differences – Behavioral theories affecting organization.

UNIT-III: Group Dynamics: Formal and informal groups – group dynamics – leadership, motivation – attitude and beliefs – management of change.

UNIT-IV: NATURE AND SCOPE OF HRM (11 Periods)

Functions and objectives of HRM. **HR PLANNING** : Nature and importance of HRP, factors affecting HRP, job analysis, nature, process of job analysis, job design, factors affecting job design, contemporary issues in job design.

UNIT-V: RECRUITMENT, SELECTION AND TRAINING (11 Periods)

Nature and importance of recruitment, recruitment process, selection process, barriers to effective selection, - Nature of training and development, Designing Training Programmes, career development, Business Process Outsourcing (BPO).

Total Periods: 55

TEXT BOOKS:

1. Prof. K. Aswathappa, "*Human resource management, text and cases*," McGraw Hill Publishing company ltd., 7th Edition, 2013.

2. L. M. Prasad, *Organizational behavior*, Sultan Chand and Sons', 4th Edition, 2006.

REFERENCE BOOKS:

1. Fred Luthans, "*Organizational behavior*," McGraw Hill Higher Education, 10th Edition, 2011.

2. Shashi K. Gupta and Rosy Joshi, "*Organizational Behavior,"* Kalyani Publications, 4th Edition, 2008.

3. P. Subba rao, "*Personnel and Human resource management*," Himalaya Publishing House Pvt. Ltd., 4th Edition, 2009.

MCA III – Semester

14MC3HS01: ORGANIZATIONAL BEHAVIOUR AND HUMAN RESOURCE MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

PRE-REQUISITES:--

COURSE OBJECTIVES:

I. To impart basic concepts of organizational behavior, Human Resource Management.
II. To develop skills related to planning and management of Human Resources.
III. To apply the concepts & theory of personality for effective Human Resource Management.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Gain Knowledge in
    a. Managerial Concepts of Organizational Behavior.
    b. Managerial Skills of Human Resource Management.
2. Develop skills of effective Human Resource Management.
3. Application of concepts and theories for optimum utilization of Human Resource.
4. Inculcates ethical principles and commitment to Professionalism.
5. Develops effective communication among the work group of an Organization.
6. Enriches empathy and enables lifelong human relations.
7. Provides a platform to emerge as a responsible individual in an Organization.
8. Provides life skills for effective operation of an organization.
9. Appreciate the significance of Human Resource Management in lifelong learning for knowledge and skill development

DETAILED SYLLABUS

UNIT–I: INTRODUCTION TO ORGANIZATIONAL BEHAVIOR (10 periods)

Introduction to organization -Concepts of organization - meaning of Organizational Behavior(OB), characteristics of OB, role of OB, approaches to the study of OB.

UNIT-II: PERSONALITY, PERCEPTION AND LEARNING (10 periods)

PERSONALITY: concept, determinants of personality, theories of personality, Organizational applications of personality.

PERCEPTION: Process of perception, inter personal perception, managerial applications of perception.

LEARNING: Components of learning process, Importance of learning, Factors affecting learning

UNIT-III: INTRODUCTION TO HRM (10 periods)

Functions and objectives of HRM

HR PLANNING: Nature and importance of HRP, factors affecting HRP, HRP Process

JOB ANALYSIS: Nature, Process of job analysis, Job Analysis and Competitive Advantage.

RECRUITMENT & SELECTION: Nature and importance of recruitment, recruitment process, selection process, barriers to effective selection.

UNIT-IV: INDUCTION, TRAINING AND PERFORMANCE APPRAISAL (10 periods)

INDUCTION: Induction, Orientation Programme, Problems of Orientation

TRAINING: Nature of training and development, gaps in training, the training process, training methods, training for career development

PERFORMANCE APPRAISAL: Managing Performance, Appraisal Process, Job Evaluation Process, Methods of Evaluation

UNIT-V: REMUNERATION, EMPLOYEE PARTICIPATION AND CONTEMPORARY ISSUES (10 periods)

REMUNERATION: Components of Remuneration, Factors influencing employee remuneration-Incentives, Types of incentives-Incentive Schemes-Employee Benefits and Services

EMPLOYEE PARTICIPATION: Empowering employees through participation-Importance and Limitations

CONTEMPORARY ISSUES: HR BPO, Call Centers, Work Life Balancing, HR Ethics, Working in cross cultural teams –Need and Challenges-Cultural Shock and Reverse Cultural Shock

TOTAL PERIODS: 50

TEXT BOOKS:

1. L.M.Prasad, *Organizational behavior*, 4th Edition, Sultan Chand and Sons', 2006. ISBN: 8 1-8054- 478-8

2. Prof. K. Aswathappa, *Human resource management, text and cases*, 7th Edition , McGraw Hill Publishing company Ltd., 2013, ISBN: 9781259026829

REFERENCE BOOKS:

1. Fred Luthans, *Organizational behavior*, 10th Edition, McGraw Hill Higher Education, 2011. ISBN : 9780071111584
2. Shashi K. Gupta and Rosy Joshi, *Organizational Behavior*, 4th Edition, Kalyani Publications, 2008 ISBN: 9788127238988
3. P. Subba rao, *Personnel and Human resource management*, 4th Edition, Himalaya Publishing House Pvt. Ltd., 2009.

MCA – III Semester

16MC30101: COMPUTER NETWORKS

Int. Marks	Ext.Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: --

COURSE DESCRIPTION:

Computer network Applications; The physical layer; The data link layer; The medium access control sub-layer; The network layer; The transport layer; The application layer; Network security.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Concepts of computer networks
- Functionality of reference models and layers
- Interfaces between layers

CO2. Analyze issues related to data link layer and transport layers using channel allocation and connection management schemes.

CO3. Design techniques for error detection and correction mechanisms suitable to ensure data integrity, access control techniques.

CO4. Investigate diverse techniques used in service user and provider layers in terms of reliability, data integrity, collision resistance and access control mechanisms.

CO5. Apply algorithms and use simulators to calculate least-cost paths for a given network.

CO6. Use the skills by using diverse communication standards and networks with the technology advancements in data communication.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION AND PHYSICAL LAYER (12 Periods)

Introduction: Uses of Computer Networks, Network Hardware-LAN, MAN and WAN, Topologies, Wireless Network-system interconnection, Wireless LAN, Wireless WAN. Internetworks, Network Software-Protocol hierarchies, Design issues for the layers, Connection Oriented and Connection less Service, Service Primitives, The relationship of Services to Protocols, Reference Models-OSI, TCP/IP.

The Physical Layer: Guided Transmission media-Magnetic Media, Twisted Pairs, Coaxial

Cable, Fiber Optics. Wireless Transmission-The Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission and Light Transmission, Communication Satellites, Multiplexing-Frequency Division Multiplexing, Wavelength Division Multiplexing, Time Division Multiplexing.

UNIT-II: THE DATA LINK LAYER (12 Periods)

The Data Link Layer: Data Link layer design issues, Error Detection and Correction, Elementary Data Link protocols-Unrestricted simplex protocol, Simplex stop-and-wait protocol, Simplex protocol for a noisy channel. Sliding Window protocols-One-bit sliding window protocol, Protocol using Go back N, Protocol using Selective Repeat.

The Medium Access Control Sub layer-The Channel Allocation problem, Multiple access protocols-ALOHA, Pure ALOHA, Slotted ALOHA. Carrier Sense Multiple Access protocols-Persistent and Non persistent CSMA-CSMA with collision detection. Collision-Free protocols-Bit map protocol, Token Passing, Binary countdown, Limited Contention protocols, Wireless LAN Protocols.

UNIT-III: THE NETWORK LAYER (13 Periods)

Network layer design issues, Routing Algorithms-Optimality principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts, Routing in Ad Hoc Networks, Congestion Control Algorithms-Congestion Prevention Policies, Jitter Control, Techniques for achieving good quality of service, Congestion control for multicasting, Internetworking, The Network layer in the Internet.

UNIT-IV: THE TRANSPORT LAYER (11 Periods)

The Transport service, Elements of Transport protocols-Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Multiplexing and Crash recovery, A simple Transport protocol, The Internet Transport protocols-Introduction to UDP, Remote Procedure Call, Real time transport Protocol, Introduction to TCP, The TCP Service Model, TCP protocol and TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Transmission Policy, TCP Sliding Window, TCP Timer Management, TCP Congestion Control.

UNIT-V: THE APPLICATION LAYER AND NETWORK SECURITY (7 Periods)

The Application Layer: Introduction to Application Layer, DNS-The Domain name space, Resource records and Name servers. Electronic Mail-Architecture and services, the user agent, message formats, message transfer and Final Delivery.

Total Periods: 55

TEXT BOOK:

1. Andrew S Tanenbaum, David J. Wetherall, "*Computer Networks*," Pearson Education, 5th Edition, 2011.

REFERENCE BOOKS:

1. Forouzan Behrouz A and MosharrafFirouz, "*Computer Networks A Top-Down Approach*," Tata McGraw Hill publications, 4th Edition, 2007.
2. William Stallings, "*Data & Computer Communications*," Pearson Education Asia, 6th Edition, 2001.
3. Prakash C. Gupta, "*Data communications and Computer Networks*," Prentice Hall of India, 2nd Edition, 2014.

MCA III-Semester
14MC30103: COMPUTER NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

PRE-REQUISITES:--

COURSE OBJECTIVES:

I. To acquire basic knowledge of network components, topologies, network models, protocols and algorithms.
II. To comprehend in-depth knowledge about the communication technologies like Domain Name Service, E-mail.
III. To analyze techniques in designing network applications.

COURSE OUTCOMES:

After successful completion of the course, the student able to

1. Understand the concept of networks, different topologies, network devices and OSI reference model.
2. Analyze Error detection and correction mechanisms to verify correct data.
3. Investigate congestion handling mechanisms and network security.
4. Design and develop a route to reach to the correct destination by using shortest path routing and Distance Vector Routing Techniques.

DETAILED SYLLABUS:-

UNIT- I: INTRODUCTION & PHYSICAL LAYER (12 Periods)

Introduction: Uses of Computer Networks, Network Hardware: LAN, WAN, Mesh Topology, Wireless Network-system interconnection, Wireless LAN, Wireless WAN. Internetworks, Network Software-Protocol hierarchies, Design issues for the layers, Connection Oriented and Connection less Services, Service Primitives, Reference Models-OSI, TCP/IP.

The Physical Layer: Guided Transmission media-Magnetic Media, Twisted Pair, Coaxial Cable, Fiber Optics. Wireless Transmission-The Electromagnetic Spectrum, Radio Transmission & Microwave Transmission**.** Multiplexing-Frequency Division Multiplexing, Wavelength Division Multiplexing, Time Division Multiplexing.

UNIT-II: THE DATA LINK LAYER (12 Periods)

The Data Link Layer: Data Link layer design issues, Error Detection and Correction, Elementary Data Link protocols-Unrestricted simplex protocol, Simplex stop-and-wait protocol, Simplex protocol for a noisy channel. Sliding Window protocols-One-bit sliding window protocol, Protocol using Go back N**.** The Medium Access Control Sublayer-The Channel Allocation problem, Multiple access protocols-ALOHA, Pure ALOHA, Slotted ALOHA. Carrier Sense Multiple Access protocols- Persistent and Non persistent CSMA, CSMA with collision detection. Collision-Free protocols- Bit map protocol, Binary countdown, Limited Contention protocols**.**

UNIT-III: THE NETWORK LAYER (11 Periods)

Network layer design issues, Routing Algorithms-Optimality principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast

Routing, Multicast Routing, Congestion Control Algorithms-Congestion Prevention Policies, Jitter Control**,** Techniques for achieving good quality of service**,** Congestion control for multicasting, Internetworking, The Network layer in the Internet**.**

UNIT-IV: THE TRANSPORT LAYER (10 Periods)

The Transport services, Elements of Transport protocols-Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing, Crash recovery, A simple Transport protocol, The Internet Transport protocols-Introduction to UDP, Remote Procedure Call, Real time transport Protocol, Introduction to TCP, The TCP Service Model, TCP protocol and TCP Segment Header.

UNIT-V: THE APPLICATION LAYER AND NETWORK SECURITY (10 Periods)

The Application Layer: Introduction to Application Layer, DNS-The Domain name space, Resource records and Name servers. Electronic Mail-Architecture and services, the user agent, message formats, message transfer and Final Delivery**.**
Network Security: Cryptography-Introduction to cryptography, Substitution Ciphers, Transposition Ciphers, One-Time Pads, and Fundamental Cryptographic Principles.

Total Periods: 55

TEXT BOOK:

1. Andrew S Tanenbaum, "*Computer Networks,*" 4th Edition, PHI publications, 2008.

REFERENCE BOOKS:

1. Forouzan, Behrouz A and Mosharraf Firouz, "*Computer Networks A Top-Down Approach,"* 1st Edition, TaTa McGraw Hill publications, 2012.
2. Stallings, William, "*Data & Computer Communications,"* 6th Edition, Pearson Education Asia, 2001.
3. Prakash C. Gupta, "*Data communications and Computer Networks"*, 1st Edition, Prentice Hall of India, 2009.

MCA – III Semester

16MC30131: COMPUTER NETWORKS LAB

Int. Marks	Ext.Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Computer Networks".

COURSE DESCRIPTION:

Implementing error detection and correction techniques; sliding window protocol; simulation of dynamic routing algorithms; congestion controlling mechanism; simulation of various Transport layer protocols.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on the concepts of networks, topologies, network devices and network simulators.

CO2. Analyze Error detection and correction mechanisms to verify and correct the data.

CO3. Develop networking protocols like TCP/IP, UDP, RPC, ARP and RARP.

CO4. Investigate congestion control mechanisms such as Leaky Bucket algorithm to achieve flow control.

CO5. Simulate dynamic routing protocols such as Distance Vector and Link state routing algorithms using NS2 simulator.

CO6. Adapt policies and mechanisms to avoid unauthorized access over the network through access control mechanisms and authentication.

CO7. Effectively communicate the routing paths through network simulators through visualization.

CO8. Advanced communication techniques can be applied by an individual to interact with remote machine through client server programming.

LIST OF EXERCISES:

1. Implement the Data Link layer error detecting method using CRC-CCITT (16-bits).
2. Implement the Data Link layer error detection and correction techniques using Hamming Code.
3. Simulate the Sliding Window Protocols used in Data Link layer to achieve flow control.
4. Simulate the congestion control using Leaky bucket algorithm.
5. Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.
6. Implementation of Socket Programming using UDP.
7. Write a program to implement subnetting and find the subnet masks.

8. a) Write a program to implement Remote Procedure Call using Remote Command Execution.

b) Implementation of RMI.

9. Write a program to simulate Address Resolution Protocol (ARP) and Reverse Address Resolution Protocols (RARP) used in Transport Layer.

10. Study of Network Simulator-NS2.

11. Simulate any Dynamic Routing Protocol used to route the packets in Network Layer.

12. **Minor Project:**

a) Design a simple textual chat application that resembles Talk command in UNIX.

b) Implementation of ping server and client application using sockets.

REFERENCE BOOKS:

1. Andrew S Tanenbaum, David J. Wetherall, "*Computer Networks*," Pearson Education, 5th Edition, 2011.
2. Forouzan Behrouz A and MosharrafFirouz, "*Computer Networks A Top-Down Approach*," Tata McGraw Hill publications, 4th Edition, 2007.
3. http://www.ns2blogger.in.

MCA – III Semester

14MC30121: OBJECT ORIENTED ANALYSIS AND DESIGN & NETWORKS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES:

Courses on "Object Oriented Programming Through JAVA" and "Software Engineering"

COURSE OBJECTIVES:

I. To understand the principles of object orientation.
II. To understand the behavior of an Application Software before deployment by using State Chart Diagrams.
III. To analyze logical, behavioral and architectural models and apply for real world applications.
IV. To comprehend in-depth knowledge about the communication technologies like Domain Name Service, E-mail.
V. To analyze techniques to design simple network.

COURSE OUTCOMES:

After successful completion this course, the student will be able to:

1. Acquire the principles of Object Oriented Development.
2. Recognize the elements of Class, Use case, Activity, Sequence and State, diagrams and develop models using them.
3. Design the domain and application artifacts to construct the Logical, behavioral and Architectural model of an Application Software.
4. Make use of UML Tool, Rational Rose to design Class, Use Case, Sequence, Collaboration, Activity, State Chart, Component and Deployment Diagrams for the an Application Software.
5. Analysis of logical and behavioral objects of an Application Software.
6. Understand the concept of networks, different topologies, network devices and OSI reference model.
7. Analyze Error detection and correction mechanisms to verify correct data.
8. Design and develop a route to reach to the correct destination by using shortest path routing and Distance Vector Routing Techniques.

LIST OF LAB PROGRAMS:

1. a) Identification of Classes, Objects, Attributes, Operations and Subclasses

   From your everyday experience identify 2 original classes of objects. Choose your second one carefully, with some computerized system in mind that it could fit into.

   For each class draw a graphical representation encapsulating seven major attributes and seven operations that apply to it.

For each of your classes state at least four examples or instantiations of it.

b) Introduction of Inheritance

Choose a third class of object of any type suitable as a base class for a hierarchy of subclasses which will inherit all the attributes and operations of their super classes.

In a tree diagram draw this class and (some of) its subclasses, at least one of which must be three levels of hierarchy below the base class. Include significant attributes and operations.

2. **Write a program for error detecting code using CRC-CCITT (16-bits).**

3. **Write a program for frame sorting technique used in buffers.**

4. **Noun-Verb Parsing**
   Apply a noun-verb parse to the following passage to identify classes and operations. Make a table listing the classes with their operations alongside, and use it to identify any subclasses which are present.

   The Blueberry Muffin Factory buys in raw ingredients, including flour, milk, eggs and blueberries. All the ingredients except the blueberries are made into a batter. The blueberries are washed and sorted (to remove any bad berries or foreign objects) and then added to the batter. The batter is then poured into baking tins and baked. The baked muffins are cooled and packaged. The packages are put in boxes and finally distributed.

5. **Write a program for distance vector algorithm to find suitable path for transmission.**

6. **a) Understanding the Logical View of the Application: Library Management System**
   a) Identification of Objects
   b) Identification of Attributes
   c) Identification of Behaviors
   d) Identification of Relationships
   The LMS would be used by the Librarian to keep track of books, Library Members and Borrowing activities. All members cannot borrow all books; few books may be available to review in the Library itself. These books are called as Reference Books.

   There are two kinds of Library Members namely, Student Members and Faculty Members. Faculty Members can check out Research papers and Magazines, where as a Student Member can check out only Books. The system need to send an Alert, whenever a book has not returned within a specific due date to both the Librarian and the Borrower through e-mail.

   The system maintains a Catalogue of having a description of each book available in the Library.

b) Developing a Class Diagram: Library Management System

a) Development of Class Diagram
b) Applying Forward Engineering and Reverse Engineering of a Class Diagram.

7. **Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.**
8. **Understanding the Interaction between Objects: Library Management System / E-Banking System**
   a) Identification of Objects
   b) Identification of Messages
   c) Development of Sequence Diagrams
   d) Development of Collaboration Diagrams

9. **Write a program for Hamming Code generation for error detection and correction.**

10. **Write a program for congestion control using Leaky bucket algorithm**
11. **Understanding the Advanced Behavioral Model of the Application: Library Management System**
    a) Identification of Actions
    b) Identification of Activities
    c) Development of Activity Diagram
    d) Development of State Chart Diagram
12. **Design TCP concurrent Client and Server application to reverse the given input sentence**
13. **Understanding the Architectural Model of the Application: Library Management System**
    Identification of Components

    a) Development of Component Diagram
    b) Modeling a Library Management System as Distributed System

REFERENCE BOOKS:

1. Grady Booch, James Rum Baugh and Ivar Jacobson, "*The Unified Modeling Language User Guide,*" Pearson Education, 1999.
2. www.uml.org
3. Department Lab Manual.
4. Rational Software Development Training Manual.
5. Andrew S Tanenbaum, "*Computer Networks,*" 4th Edition, PHI publications, 2008.
6. Forouzan, Behrouz A and Mosharraf Firouz, "*Computer Networks A Top-Down Approach,*" 1st Edition, TaTa McGraw Hill publications, 2012.

MCA III – Semester

16MC30132: DATA WAREHOUSING AND DATA MINING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A course on "Data Warehousing and Data Mining".

COURSE DESCRIPTION:

Develop Transformations using Data Warehouse ETL tool; Creation of Datasets; Data Preprocessing; Association Rule Mining; Classification and Clustering; Multimedia, Text, Web Data Mining and Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Data acquisition process
- Data preprocessing methods
- Data Mining algorithms

CO2. Analyze frequent itemsets using Apriori and FP-growth algorithms.

CO3. Design and construct data acquisition process from one data source to other target data source using data warehouse ETL tool.

CO4. Develop solutions for complex computing problems by applying appropriate data mining algorithms to evaluate the accuracy and error measures using WEKA components.

CO5. Use WEKA tool to preprocess weather, hospital, and banking datasets to discover knowledge for making future predictions effectively.

CO6. Communicate effectively in implementing data mining problems with respect to documentation and visualization of hidden patterns.

CO7. Apply the knowledge of data mining to assess and provide computing solutions for societal issues.

CO8. Function effectively as an individual and as a member in a team to manage and implement data mining application in multidisciplinary environment.

LIST OF EXERCISES

PART –A

Creation of Active/Passive transformations using Data Warehouse (Extract, Transform, Load) ETL Tool

1. Construct data acquisition process to extract, transform and load data from different databases.
2. Design and implement data acquisition process to perform
   a) Expression Transformation
   b) Joiner Transformation
3. Design and implement data acquisition process to perform
   a) Aggregator Transformation
   b) Source Qualifier Transformation
4. Design and implement data acquisition process to perform
   a) Filter Transformation
   b) Router Transformation
5. Design and implement data acquisition process to perform
   a) Ranker Transformation
   b) Sorter Transformation

PART -B

Working with Data Mining - WEKA tool.

6. Creation on weather nominal and student results data sets in .arff and .csv formats
7. Perform data preprocessing steps on weather nominal and student information data sets as follows:
   a) Handling of missing values for categorical and nominal values.
   b) Selection of relevant attributes.
   c) Applying normalization techniques
8. Perform Association rule mining algorithm on preprocessed data set.
9. Perform classification and prediction on processed data set using J48 and ID3 algorithms.
10. Use Experimenter WEKA component to evaluate the accuracy and error measures of a classifier or predictor.
11. Verify ID3 classifier performance using Gain ration and Ranker method using a Knowledge flow WEKA component.

12. Minor Project

Step 1: Creation of data set.

Step 2: Apply preprocessing techniques on constructed data sets.

Step 3: Implement appropriate data mining algorithms such as:

a. Apriori algorithm – to find frequent itemsets using various support and confidence levels

b. FP growth association mining

c. ID3 decision tree classifier

d. Build a confusion matrix to compute sensitivity, specificity, precision, recall, weighted accuracy and correlation between the attributes.

Data sets: Super Market data, Health data, Banking system, Weather forecasting, social media and Iris data.

REFERENCE BOOKS:

1. Ian H. Witten, Eibe Frank, and Mark,"*A Data Mining: Practical Machine Learning Tools and Techniques,"* Hall Morgan Kaufmann, 3rd Edition, 2011.
2. Ralph Kimball, "*The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling,"* John Wiley & Sons Inc, 3rd Edition, 2013.
3. G. K. Gupta, "*Introduction to Data Mining with Case Studies,"* PHI, New Delhi, 3rd Edition, 2009.

MCA III – Semester

14MC30122: DATA WAREHOUSING AND DATA MINING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES:

A course on "Data Base Management Systems".

COURSE OBJECTIVES:

I. To understand the concepts of Data Warehouse system, Data Warehouse system architecture, data mining principles and techniques.
II. To analyze and demonstrate data mining algorithms like Apriori, FP-growth, k-mediod and gaining better understanding of business trends.
III. To develop and apply critical thinking, problem-solving, and decision-making skills.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Understand the role of data warehouse, architecture and its support for quality data.
2. Ability to identify the association rules, classifying by using decision tree algorithms and clustering large data sets using k-mediods, k-means, etc.
3. Design and implement Hierarchical Methods**-**Agglomerative clustering, divisive hierarchical clustering and Classification by Decision Tree to perform proactive analysis, predictive modeling, and identifying new trends and behaviors.
4. Investigate preprocessing of data and apply mining techniques on it.
5. Apply data mining algorithms like J48, ID3, Random forest and evaluate results by using tool WEKA.

LIST OF LAB PROGRAMS

Using Open Source for Data Warehousing (Business Intelligence)
Integrating data from different databases to Extracting, Transformation and Loading

1. To perform various commands given in PL/SQL in Oracle 8.0(For brushing up.)
2. Knowing IDE of Open Source for Data Warehousing (Business Intelligence) for Integrating data from different databases to Extracting, Transformation and Loading

3.
   a. Construct a data acquisition process to perform the Source to target.
   b. Construct a data acquisition process to perform the Sorter Transformation and Aggregator Transformation form one data source to target.
4.
   a. Construct a data acquisition process to perform the Filter Transformation form one data source to target.
   b. Construct a data acquisition process to perform the Joiner Transformation from oracle data source to target.
   c. Construct a data acquisition process to perform the Aggregator Transformation form one data source to target.
5.
   a. Construct a data acquisition process to perform the Filter Transformation and Expression Transformation in source Qualifier form one data source to target.

b. Construct a data acquisition process to perform the Joiner Transformation in source qualifier form one data source to target.

6.

a. Construct a data acquisition process to perform the Router Transformation form one data source to a minimum of three target tables.
b. Construct a data acquisition process to perform the Ranker Transformation form one data source to target.
c. Construct a data acquisition process to perform the Expression Transformation form one data source to target.

Learn to perform data mining tasks using a data mining toolkit (such as open source WEKA) Understand the data sets and data preprocessing, Demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering and regression, Exercise the data mining techniques with varied input values for different parameters. To obtain practical experience using data mining techniques on real world data sets. Emphasize hands-on experience working with all real data sets.

7. Introduction to the Weka machine learning toolkit
    a. Create a Buys_Computer dataset in .arff format. The following are the fields: age, income student,credit_rating, buys_computer
    b. Create a Student Results Data set in .CSV format(Minimum required fields should be seven)

Credit Risk Assessment- Data mining case study

Description:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient. To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.

2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance.

Translate this knowledge from text form to production rule form.

3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.

4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application

The German Credit Data:

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. credit dataset (original) Excel spreadsheet version of the German credit data.

In spite of the fact that the data is German, you should probably make use of it for this assignment.(Unless you really can consult a real loan officer !)

A few notes on the German dataset

• DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).

• owns_telephone. German phone rates are much higher than in Canada so fewer people own telephones.

• foreign_worker. There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents.

• There are 20 attributes used in judging a loan applicant. The goal is the classify the applicant into one of two categories, good or bad.

(Turn in your answers to the following tasks)

- List all the categorical (or nominal) attributes and the real-valued attributes separately.
- What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes
- One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training.
- Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy?
- Is testing on the training set as you did above a good idea ? Why or Why not One approach for solving the problem encountered in the previous question is using cross validation?
- Describe what cross-validation is briefly. Train a Decision Tree again using cross validation and report your results. Does your accuracy increase/decrease? Why?
- Check to see if the data shows a bias against "foreign workers" (attribute 20), or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss.
- Another question might be, do you really need to input so many attributes to get good results?
- Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)

8.

- Performing data preprocessing for data mining in Weka
- Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the mis-classifcations equally in both cases, give a higher cost to the first

case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in problem 6 (using equal cost)?

- Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model?
- You can make your Decision Trees simpler by pruning the nodes. One approach is to use
- Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase?
- (Extra Credit): How can you convert a Decision Trees into "if-then-else rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one! Can you predict what attribute that might be in this dataset? OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and oneR.

9. Classification using the Weka toolkit
   - ✓ Classify a weather nominal dataset using J48 algorithm.
   - ✓ Classify a weather nominal dataset using ID3 algorithm.
10. Performing clustering in Weka.

11. Association rule analysis in Weka.

12. Verify ID3 classifier performance using Gain ration and Ranker method using a Knowledge flow WEKA component.

REFERENCE BOOKS:

1. Ian H. Witten, Eibe Frank, and Mark, "A Data Mining: Practical Machine Learning Tools and Techniques," 3rd Edition, Hall Morgan Kaufmann, 2011.

2. Ralph Kimball, "The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling," 3rd Edition, John Wiley & Sons Inc, 2013.

Task Resources:

- Mentor lecture on Decision Trees
- Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross Validation)
- Decision Trees (Source: Tan, MSU)
- Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)
- Weka resources:
  - Introduction to Weka (html version) (download ppt version)
  - Download Weka
  - Weka Tutorial
  - ARFF format
  - Using Weka from command line

MCA – III Semester

16MC30133: OBJECT ORIENTED ANALYSIS AND DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Object Oriented Analysis and Design".

COURSE DESCRIPTION:

Analyze specifications; Design Class Diagrams; Object Diagrams; Usecase Diagrams; Interaction Diagrams; Activity Diagrams; State Chart Diagrams; Component Diagrams; Deployment Diagrams

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Library Management System
- ATM Application
- Online Bookshop
- Railway Reservation System

CO2. Analyze applications and specifications to develop static and behavioral models.

CO3. Design and construct the Logical, Behavioral and Architectural model of an Application.

CO4. Construct a project from beginning to end using UML Tool, Rational Rose for an Application Software.

CO5. Communicate effectively with all the team members about various logical and behavioral objects of an Application Software.

CO6. Asses the common modeling techniques to be applied for a system for the societal applications.

LIST OF EXERCISES

Design of Applications

- Library Management System
- ATM Application
- Online Bookshop
- Railway Reservation System

1. IDE of Rational Rose or Visual Paradigm.
2. Analyze and construct UseCase diagrams for the above applications.
3. Analyze and construct Class diagrams for the above applications.
4. Construct sequence diagram for use cases of Library Management System and ATM Application.
5. Construct sequence diagram for use cases of Online Bookshop and Railway Reservation System.
6. Construct Collaboration diagram for use cases of Library Management System and ATM Application.
7. Construct Collaboration diagram for use cases of Online Bookshop and Railway Reservation System.
8. Construct Activity diagram for use cases of Library Management System and ATM Application.
9. Construct Activity diagram for use cases of Online Bookshop and Railway Reservation System.
10. Construct State Chart diagram for use cases of Library Management System and ATM Application.
11. Construct State Chart diagram for use cases of Online Bookshop and Railway Reservation System.
12. Analyze and construct Component diagrams for the above applications.
13. Analyze and construct Deployment diagrams for the above applications.

REFERENCE BOOKS:

1. Grady Booch, James Ram Baugh and Ivar Jacobson, "*The Unified Modeling Language User Guide,"* Pearson Education, 1999.
2. www.uml.org.
3. Rational Software Development Training Manual.

MCA – III Semester

14MC30121: OBJECT ORIENTED ANALYSIS AND DESIGN & NETWORKS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES:

Courses on "Object Oriented Programming Through JAVA" and "Software Engineering"

COURSE OBJECTIVES:

VI. To understand the principles of object orientation.
VII. To understand the behavior of an Application Software before deployment by using State Chart Diagrams.
VIII. To analyze logical, behavioral and architectural models and apply for real world applications.
IX. To comprehend in-depth knowledge about the communication technologies like Domain Name Service, E-mail.
X. To analyze techniques to design simple network.

COURSE OUTCOMES:

After successful completion this course, the student will be able to:

1. Acquire the principles of Object Oriented Development.
2. Recognize the elements of Class, Use case, Activity, Sequence and State, diagrams and develop models using them.
3. Design the domain and application artifacts to construct the Logical, behavioral and Architectural model of an Application Software.
4. Make use of UML Tool, Rational Rose to design Class, Use Case, Sequence, Collaboration, Activity, State Chart, Component and Deployment Diagrams for the an Application Software.
5. Analysis of logical and behavioral objects of an Application Software.
6. Understand the concept of networks, different topologies, network devices and OSI reference model.
7. Analyze Error detection and correction mechanisms to verify correct data.
8. Design and develop a route to reach to the correct destination by using shortest path routing and Distance Vector Routing Techniques.

LIST OF LAB PROGRAMS:

1. a) Identification of Classes, Objects, Attributes, Operations and Subclasses

   From your everyday experience identify 2 original classes of objects. Choose your second one carefully, with some computerized system in mind that it could fit into.

   For each class draw a graphical representation encapsulating seven major attributes and seven operations that apply to it.

For each of your classes state at least four examples or instantiations of it.

b) Introduction of Inheritance

Choose a third class of object of any type suitable as a base class for a hierarchy of subclasses which will inherit all the attributes and operations of their super classes.

In a tree diagram draw this class and (some of) its subclasses, at least one of which must be three levels of hierarchy below the base class. Include significant attributes and operations.

2. **Write a program for error detecting code using CRC-CCITT (16-bits).**

3. **Write a program for frame sorting technique used in buffers.**

4. **Noun-Verb Parsing**
   Apply a noun-verb parse to the following passage to identify classes and operations. Make a table listing the classes with their operations alongside, and use it to identify any subclasses which are present.

   The Blueberry Muffin Factory buys in raw ingredients, including flour, milk, eggs and blueberries. All the ingredients except the blueberries are made into a batter. The blueberries are washed and sorted (to remove any bad berries or foreign objects) and then added to the batter. The batter is then poured into baking tins and baked. The baked muffins are cooled and packaged. The packages are put in boxes and finally distributed.

5. **Write a program for distance vector algorithm to find suitable path for transmission.**

6. **a) Understanding the Logical View of the Application: Library Management System**
   e) Identification of Objects
   f) Identification of Attributes
   g) Identification of Behaviors
   h) Identification of Relationships
   The LMS would be used by the Librarian to keep track of books, Library Members and Borrowing activities. All members cannot borrow all books; few books may be available to review in the Library itself. These books are called as Reference Books.

   There are two kinds of Library Members namely, Student Members and Faculty Members. Faculty Members can check out Research papers and Magazines, where as a Student Member can check out only Books. The system need to send an Alert, whenever a book has not returned within a specific due date to both the Librarian and the Borrower through e-mail.

   The system maintains a Catalogue of having a description of each book available in the Library.

b) Developing a Class Diagram: Library Management System

c) Development of Class Diagram
d) Applying Forward Engineering and Reverse Engineering of a Class Diagram.

7. **Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.**
8. **Understanding the Interaction between Objects: Library Management System / E-Banking System**
   e) Identification of Objects
   f) Identification of Messages
   g) Development of Sequence Diagrams
   h) Development of Collaboration Diagrams

9. **Write a program for Hamming Code generation for error detection and correction.**

10. **Write a program for congestion control using Leaky bucket algorithm**
11. **Understanding the Advanced Behavioral Model of the Application: Library Management System**
    e) Identification of Actions
    f) Identification of Activities
    g) Development of Activity Diagram
    h) Development of State Chart Diagram
12. **Design TCP concurrent Client and Server application to reverse the given input sentence**
13. **Understanding the Architectural Model of the Application: Library Management System**
    Identification of Components

    c) Development of Component Diagram
    d) Modeling a Library Management System as Distributed System

REFERENCE BOOKS:

1. Grady Booch, James Rum Baugh and Ivar Jacobson, *"The Unified Modeling Language User Guide,"* Pearson Education, 1999.
2. www.uml.org
3. Department Lab Manual.
4. Rational Software Development Training Manual.
5. Andrew S Tanenbaum, "*Computer Networks,"* 4th Edition, PHI publications, 2008.
6. Forouzan, Behrouz A and Mosharraf Firouz, "*Computer Networks A Top-Down Approach,"* 1st Edition, TaTa McGraw Hill publications, 2012.

MCA IV-SEMESTER

16MC40101: BIG DATA ANALYTICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Data warehousing and Data Mining" and "Object Oriented Programming through JAVA".

COURSE DESCRIPTION:

Big data Analytics usage and Outcomes; Types of big data; Challenges of analyzing big data; Analytics tools for big data; Requirements of Hadoop; Adapting Hadoop File systems and I/O; MapReduce Application; Administration of Hadoop; Big data analytics; R Programming on Hadoop.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Acquire knowledge on
- Basic concepts of Big Data Analytics and current trends in Big Data
- MapReduce and R Tool
- HDFS and MapReduce in Big Data Hadoop.

CO2. Analyze the big data types as Structured, unstructured and semi-structured.

CO3. Design and develop methods using Map Reduce technique to solve:
- Varieties of data formats in Hadoop Framework for an application.
- Methods, Dimensions, and practices for Big Data applications.

CO4. Solve complex problems in Big Data by adopting appropriate techniques to provide insights for small and medium business.

CO5. Apply modern tools like HIVE and R to perform analytics in an user friendly environment on Hadoop platform.

CO6. Demonstrate knowledge as an individual to manage Weather sensors application.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO BIG DATA ANALYTICS (11 periods)

Defining Big Data Analytics : Introduction to Big data, Usage of big data- Basic analytics, Advanced analytics, Operationalized analytics, Monetizing analytics; Modifying Business Intelligence Products to Handle Big Data: Analytical algorithms, Infrastructure support; Big Data Analytics Examples , Big Data Analytics Solutions.

Meet Hadoop: Data Storage and Analysis, Comparison with Other Systems, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem.

UNIT-II: HADOOP (10 Periods)

MapReduce: A Weather Dataset Ecosystem, Analyzing the Data with UNIX Tools, Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Hadoop Pipes.

The Hadoop Distributed File system: The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File systems.

Hadoop I/O: Data Integrity, Compression, Serialization, File-Based Data Structures.

UNIT – III: APPLICATIONS OF HADOOP MAPREDUCE (11 Periods)

Developing a MapReduce Application: The Configuration API, Configuring the Development Environment, Writing a Unit Test, Running Locally on Test Data, Running on a Cluster.

How MapReduce Works: Anatomy of a MapReduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution.

MapReduce Types and Formats: MapReduce Types, Input Formats, Output Formats.

UNIT -IV: FEATURES AND ADMINISTERING HADOOP (11 Periods)

MapReduce Features: Counters, Sorting, Joins, Side Data Distribution, MapReduce Library Classes.

Setting Up a Hadoop Cluster: Cluster Specification, Cluster Setup and Installation, SSH Configuration, Hadoop Configuration, Security, Benchmarking a Hadoop Cluster.

Administering Hadoop: HDFS, Monitoring, Maintenance.

UNIT -V: R PROGRAMMING ON HADOOP (12 Periods)

Introduction to R: R Data Structures, Help functions in R, Vectors, Scalars, Declarations, Common Vector operations, Using all and any, Vectorised operations: NA and NULL values, Filtering, Vectorised if-then else.

Matrices, Arrays And Lists: Creating matrices, Matrix operations, Applying Functions to Matrix Rows and Columns, Adding and deleting rows and columns, Vector/Matrix Distinction , lists, Creating lists, General list operations, Accessing list components and values – applying functions to lists.

CASE STUDY: Analyze one of the social network data to draw insights for the societal benefit.

Total Periods: 55

TEXT BOOKS:

1. Tom White, "*Hadoop: The Definitive Guide,*" Oreilly and Yahoo press, 3rd Edition, 2012.
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, and Marcia Kaufman, "*Big Data for Dummies,*" John Wiley & Sons, Inc., 2013.

REFERENCE BOOK:

1. Frank J. Ohlhorst, "*Big Data Analytics: Turning Big Data into Big Money*," Wiley Publication, December 2012.

MCA IV-SEMESTER

14MC40103: BIG DATA ANALYTICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

PRE-REQUISITES:
Course on "Data warehousing and Data Mining," and "Object Oriented Programming"

COURSE OBJECTIVES:

I. To impart Knowledge on fundamentals, Large Data sets, dimensions of Big Data.
II. To provide knowledge on current Big Data trends, Data Analytics and Big Data Security.
III. To acquire skills on Big Data Tools such as SQOOP, PIG, Hive and Mahout.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Acquire knowledge of HDFS and MapReduce in Big Data Hadoop.
2. Solve problems in modern Data Analysis and Big Data Analytics.
3. Design, develop and analyze applications for Volume, Velocity and variety of Hadoop Framework based applications.
4. Design & Develop a large size system following the dimensions, practices, and methods for analyzing Big Data applications.
5. Effectively utilize the modern tools like HADDOP, HIVE, PIG etc.,
6. Follow ethical code of conduct in professional activities such as Data reports, evaluation and Data analytics.

DETAILED SYLLABUS:-

UNIT- I: INTRODUCTION TO BIG DATA (11 Periods)

Introduction to Big data: The Evolution of Big Data, What Is Big Data, Why Big Data Matters, Big Data Sources, The Big data Revolution, Security, Compliance, Auditing and Protection.
Big Data in the Enterprise: New Business Models, New Revenue Growth Opportunities, What Technology Investments Can Enable the Analytics Capabilities? How Do You Get Started on the Big Data Journey?

UNIT-II: APPLICATION ARCHITECTURES FOR BIG DATA AND ANALYTICS

(10 Periods)

Big Data Warehouse and Analytics, Big Data Warehouse System Requirements and Hybrid Architectures, Enterprise Data Platform Ecosystem – BDW and EDW, How does Traditional Data Warehouse processes map to tools in Hadoop Environment?

Big Data Analytics Methodology: Challenges in Big Data Analysis, Big Data Analytics Methodology, Develop Business Hypotheses

UNIT-III: HADOOP (11 Periods)

Meet Hadoop: Data Storage and Analysis, Comparison with Other Systems, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem.
MapReduce: A Weather Dataset, Analyzing the Data with Unix Tools, Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Hadoop Pipes.
The Hadoop Distributed File system: The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File systems.

UNIT – IV: APPLICATIONS OF HADOOP MAPREDUCE (11 Periods)

Hadoop I/O: Data Integrity, Compression, Serialization, File-Based Data Structures.
Developing a MapReduce Application: The Configuration API, Configuring the Development Environment, Writing a Unit Test, Running Locally on Test Data, Running on a Cluster.
How MapReduce Works: Anatomy of a MapReduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution.
MapReduce Types and Formats: MapReduce Types, Input Formats, Output Formats.

UNIT -V: FEATURES AND ADMINISRATION OF HADOOP (12 Periods)

MapReduce Features: Counters, Sorting, Joins, Side Data Distribution, MapReduce Library Classes.
Setting Up a Hadoop Cluster: Cluster Specification, Cluster Setup and Installation, SSH Configuration, Hadoop Configuration, YARN Configuration, Security, Benchmarking a Hadoop Cluster, Hadoop in the Cloud.
Administering Hadoop: HDFS, Monitoring, Maintenance.
Pig: Installing and Running Pig, Comparison with Databases, Pig Latin, User-Defined Functions

Total Periods: 55

TEXT BOOKS:

1. Tom White, "*Hadoop: The Definitive Guide*," Oreilly and Yahoo press, Third Edition, 2012.
2. Soumendra Mohanty, Madhu Jagadeesh and Harsha Srivasta "Big Data Imperatives", Apress, First Edition, 2013.

REFERENCE BOOK:

1. Frank J. Ohlhorst**, "***Big Data Analytics: Turning Big Data into Big Money*," Wiley Publication, ISBN: 1118147596, December 2012.

MCA IV-Semester

16MC40102: LINUX PROGRAMMING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Computer Networks".

COURSE DESCRIPTION:

LINUX operating system features; Architecture of LINUX operating system; LINUX environment; Shell Script; Signals and Sockets.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on LINUX operating system and utilities.

CO2. Analyze the Bourne shell, LINUX files, processes and signals to solve problems in Linux operating system.

CO3. Design and develop the programs by using LINUX system tools like vi editor, File, Text, Network and Backup utilities.

CO4. Solve Advanced C and Shell Script Programming problems in Linux Environment. Select and apply appropriate techniques like semaphores, Messages and Shared Memory to develop inter Process communication in Linux.

CO5. Communicate effectively with Linux operating system through different application programs.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO LINUX FILE SYSTEM (11 Periods)

Linux Utilities- Introduction to Linux file system, vi editor, File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities, sed – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts, operation, patterns, actions, functions, using system commands in awk.

UNIT II: SHELL PROGRAMMING (11 Periods)

Working With The Bourne Shell: shell, shell responsibilities, pipes and input Redirection, output redirection, here documents, the shell as a programming language, shell meta

characters, shell variables, shell commands, the environment, control structures, shell script examples.

UNIT III: LINUX FILE APIS (11 Periods)

Linux Files: File types, file systems, File attributes, i-nodes, application program interface to files, kernel support files, relationship of C stream pointers and file descriptors, directory files, hard and symbolic links.

Linux File APIs: General file APIs, file and record locking, directory file APIs, device file APIs, general file class, regfile class for regular class, dirfile class for directory files, FIFO file class , device file class, symbolic link file class, file listing program.

UNIT-IV: LINUX PROCESSES AND SIGNALS (11 Periods)

Linux Processes: LINUX kernel support for processes, process APIs, process attributes, change process attributes, process control - process creation, waiting for a process, process termination, zombie process, orphan process

Signals: LINUX kernel support for signals, signal, signal mask, sigaction, the SIGCHLD Signal and the waitpid API, the sigsetjmp and siglongjmp APIs, kill, alarm, Interval timers, POSIX. 1b timers, timer class.

UNIT- V: INTERPROCESS COMMUNICATION AND SOCKETS

(11 Periods)

Interprocess Communications: IPC methods, the UNIX System V IPC methods, UNIX System V messages, Messages Example, UNIX system V semaphores, Semaphore Example, UNIX System V shared memory, Shared memory Example.

Sockets: Introduction to Sockets, Socket Addresses, Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs.

Total Periods: 55

TEXT BOOKS:

1. T. Chan, "*UNIX system programming using C++*," PHI, 2008.
2. Sumitabha Das, "*UNIX Concepts and Applications*," TMH, 4th Edition, 2008.

REFERENCE BOOKS:

1. W.R. Stevens, "*UNIX Network Programming*," Pearson Education, 2008
2. Graham Glass, King Ables, "*UNIX for programmers and users,*" Pearson Education, 3rd Edition, 2003.
3. Kernighan and Pike, "*UNIX programming environment*," Pearson Education, 2006.

MCA–IV Semester

16MC40104: SERVICE ORIENTED ARCHITECTURE

(Professional Elective–I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION:

Web Services; Principles of SOA; Service Layers; Simple Object Access Protocol (SOAP); Web Services Description Language (WSDL).

COURSE OUTCOMES:

On successful completion of this course, the student will be able to:

CO1. Demonstrate knowledge on:

- Principles, services and policies of service orientation.
- Fundamentals of web services.
- XML, WSDL related to SOA

CO2. Analyze complex business process critically in identifying appropriate service model logic.

CO3. Design service oriented architecture suitable for different environments.

CO4. Use XML, SOAP and service interface design tools for building service oriented architecture.

DETAILED SYLLABUS:

UNIT - I: SOA AND WEB SERVICES FUNDAMENTALS (12 Periods)

Introducing SOA: Fundamental SOA, Common Characteristics of Contemporary SOA, Common misperceptions about SOA, Common Tangible benefits of SOA, Common pitfalls of adopting SOA.

The Evolution of SOA: An SOA Timeline, The continuing evolution of SOA, The roots of SOA, Orchestration.

Web Services and Primitive SOA: The Web Services framework, Services, Service descriptions, messaging, Security.

UNIT - II: SOA AND WS-* EXTENSIONS (10 Periods)

WS-* and Contemporary SOA (Part I): Message Exchange Patterns, Service Activity, Coordination, Atomic transactions, Business Activities, Orchestration.

WS-* and Contemporary SOA (Part-II): Addressing, Reliable messaging, Correlation, Policies, Metadata exchange, Security.

UNIT - III: PRINCIPLES, SERVICE LAYERS AND PLANNING (11 Periods)

Principles of Service-Orientation: Anatomy of SOA, Common principles of Service Orientation, Inter relationship of Service Orientation Principles, Service Orientation and Object Orientation, Native web service Support for service orientation principles.

Service Layers: Service-Orientation and Contemporary SOA, Service Layer abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer, Agnostic Services, Service Layer Configuration Scenarios.

SOA Delivery Strategies: SOA delivery lifecycle phases, The Top-down strategy, the bottom-up strategy, the agile strategy.

UNIT - IV: BUILDING SOA AND SERVICE MODELING (10 Periods)

Service Oriented Analysis: Introduction to service oriented analysis, Comparison of service oriented Architecture and Service Oriented Environment, Benefits of a Business Centric SOA and Deriving Business Services.

Service Modeling: Service Modeling, Service Modeling guidelines, Classifying Service model logic, Contrasting Service modeling approaches.

UNIT - V: BUILDING SOA AND SERVICE DESIGN (12 periods)

Service-Oriented Design: WSDL related XML Schema language basics, WSDL language basics, SOAP language basics, Service interface design tools.

SOA Composition Guidelines: Steps to composing SOA, Considerations for choosing service layers, Considerations for positioning for choosing SOA extensions.

Service Design: Service Design overview, Entity-centric business Service Design, Application Service Design, Task-centric business Service Design, Service Design guidelines.

Total Periods: 55

TEXT BOOK:

1. Thomas Erl, **"***Service-Oriented Architecture - Concepts, Technology, and Design,"* Pearson, 2011.

REFERENCE BOOKS:

1. Eric Newcomer, *"Understanding SOA with Web Services,"* Pearson Education, 2nd Edition, 2005.
2. Shankar Kambhampaty, *"Service Oriented Architecture for Enterprise and Cloud Applications,"* Wiley-India, 2nd Edition, 2010.

MCA IV-SEMESTER

14MC40104: SERVICE ORIENTED ARCHITECTURE

(ELECTIVE-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

PRE-REQUISITES:

A Course on "Software Engineering"

COURSE OBJECTIVES:

I. To provide basic principles of service orientation, service oriented analysis techniques and service design.
II. To excel with advanced Web Service specification standards.
III. To develop customized software applications using SOA Platform.

COURSE OUTCOMES:

After the completion of the course, a successful student able to:

1. Acquire the knowledge of software oriented architectures and the service composition.
2. Solve complex software applications using SOA principles.
3. Design and develop a modern software development project using SOA.
4. Apply prototype techniques in software development project using process oriented architectures and service oriented architectures.

DETAILED SYLLABUS:-

UNIT I: INTRODUCING SOA AND EVOLUTION OF SOA (10 PERIODS)

Fundamental SOA, Common Characteristics of Contemporary SOA, Common tangible benefits of SOA, Common pitfalls of adopting SOA. **The Roots of SOA:** Characteristics of SOA, Comparing SOA to client-server and distributed internet and hybrid Web Service architectures.

UNIT II: WEB SERVICES AND PRIMITIVE SOA, CONTEMPORARY SOA, SERVICE LAYERS (12 PERIODS)

The Web services framework, Services, Service descriptions, Messaging with SOAP, Message exchange patterns, Service activity, Coordination, Atomic Transactions, Business activities, Orchestration, Choreography, Service layer abstraction, Application Service Layer, Business Service Layer , Orchestration Service Layer.

UNIT III: SERVICE ORIENTED ANALYSIS AND DESIGN (12 PERIODS)

Introduction to service-oriented analysis, Benefits of a business-centric SOA, Deriving business services, Service Modeling. **Service Oriented Design:** Introduction to service-

oriented design, WSDL basics, SOAP basics, Entity-centric business service design, Application service design, Task-centric business service design.

UNIT IV: SOA PLATFORM (11 PERIODS)

SOA platform basics. **SOA support in J2EE:** Platform overview, Primitive SOA support, Support for service oriented principles, Contemporary SOA support. **SOA support in .NET:** Platform overview, Primitive SOA support, Support for service oriented principles, Contemporary SOA support.

UNIT V: BUSINESS PROCESS DESIGN (10 PERIODS)

WS-BPEL language basics, WS-Coordination overview, Service oriented business process design, WS-Policy Language basics , WS Security language basics.

TOTAL PERIODS: *55*

TEXT BOOK:

1. Thomas Erl**, "***Service-Oriented Architecture: Concepts, Technology, and Design*," Pearson Education, 2005. ISBN 978-81-317-1490-4.

REFERENCE BOOKS:

1. Newcomer, Lomow, *"Understanding SOA with Web Services"*, Pearson Education, 2005.
2. Sandeep Chatterjee, James Webber, *"Developing Enterprise Web Services, An Architect's Guide"*, Pearson Education, 2005.
3. Dan Woods and Thomas Mattern, *"Enterprise SOA Designing IT for Business Innovation,"* O'REILLY, First Edition, 2006.

MCA IV - Semester

16MC40105: INTERNET OF THINGS

(Professional Elective – I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE: A Course on **"**Computer Networks".

COURSE DESCRIPTION:

Internet of Things(IoT) Components; Communication models; Prototyping; Hardware; Design models; Development platforms; Analytics for IoT.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Protocols, Functional blocks and communication models of Internet of things.

CO2. Identify appropriate sensors and communication modes used in IoT based systems.

CO3. Design appropriate solutions for IoT applications using Raspberry Pi and Arduino kits.

CO4. Appropriately synthesize the models and applications for usage in Home automation and cities.

CO5. Apply evolutionary techniques to perform analytics on the data integrated from IoT based systems.

CO6. Use Professional engineering principles to design and develop applications using IoT.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION AND DOMAIN APPLICATIONS (10 periods)

Introduction to Internet of Things:

Definition of Internet of Things, Characteristics, Things, Protocols, Logical Design, Functional Blocks, Communication models, APIs, Enabling Technologies, Levels and Deployment templates, Introduction to M2M, Difference between IoT and M2M, Software Defined Networking, Network Function Virtualization.

UNIT- II: DEVICES AND END POINTS (12 periods)

IoT Device, Examples - Arduino, Raspberry PI; Programming Raspberry PI with Python, Other IoT devices, Domain Specific IoTs.

UNIT-III: SENSORS AND CONNECTIVITY (12 periods)

Sensors-Types of Sensor Nodes; Internet Communications, IP Addresses, MAC Address, TCP and UDP ports, Application Layer Protocols, Need for IoT Systems Management, SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG.

UNIT-IV: DESIGN METHODOLOGY AND CASE STUDIES (10 periods)

Design Methodology:

Purpose and Requirements specifications, Process Specifications, Domain Model specifications, Information Model specifications, Service specification, IoT Level Specifications, Functional View specifications, Operational View specifications, Device and Component integration, Application development, Cloud Storage Models and Communications APIs, WAMP, Xively Cloud for IoT.

Case Studies: Weather Monitoring System.

UNIT-V: DATA ANALYTICS FOR IOT (11 periods)

Analytics, Apache Hadoop, Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm

Tools: Chef and Case studies.

Total Periods: 55

TEXT BOOK:

1. Arshdeep Bahga, Vijay Madisetti, "*Internet of Things – A hands-on approach*," University Press, 2015.

REFERENCE BOOKS:

1. Adrian McEwen and Hakim Cassimally, "*Designing the Internet of Things*," Wiley Publishing, 2013.
2. CharlesBell, "*Beginning Sensor Networks with Arduino and Raspberry Pi*," Apress, 2013.
3. Marco Schwartz, "*Internet of Things with the Arduino Yun*," Packt Publishing, 2014.
4. Matt Richardson, Shawn Wallace, "*Getting Started with Raspberry Pi*," Maker Media, Inc, 2012.

MCA – IV Semester

16MC40106: COMPUTER FORENSICS

(Professional Elective-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Computer Networks".

COURSE DESCRIPTION:

Computer forensics technologies and cybercrime; Evidence collection and data seizure; Initial Response and Forensic Duplication; Open source tools for Forensic Process; Forensic Data Analysis and Validation; Processing crimes and incident scenes; Mobile Device Forensics; Network Forensics; E-mail Investigation; Report writing.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Process Fundamentals and Technologies
- Evidence Capture and Computer Forensic Analysis
- Law Enforcement crime and incident scenes

CO2. Analyze and validate digital evidence found in digital storage device.

CO3. Design and develop solutions for a forensic process based on type of communication standards, electronic device capabilities and specifications.

CO4. Investigate and contribute in groups for the development of new forensics tools- Forensic Card Reader, Cell Seizure and MOBILedit.

CO5. Apply forensic tools- Forensic SIM, WinHex and techniques to acquire and verify the evidence.

CO6. Commit to ethics and follow Law of Enforcement standards for digital Forensics and crime investigations.

DETAILED SYLLABUS:

UNIT – I: OVERVIEW OF COMPUTER FORENSICS TECHNOLOGY AND CYBERCRIME (10 periods)

Computer Forensics Fundamentals: Introduction to computer Forensics, Use of computer Forensics in Law Enforcement, Computer Forensics Assistance to Human

Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists.

Types of Computer Forensics Technologies: Types of Military Computer Forensic Technology, Types of Law Enforcement - Computer Forensic Technology, Types of Business Computer Forensic Technology.

Introduction to Cybercrime: Cybercrime, Cybercrime and Information Security, Cybercriminals, Classification of Cybercrimes, Cyber Detectives.

UNIT – II: COMPUTER FORENSICS EVIDENCE AND CAPTURE (10 periods)

Data Recovery: Data back-up and Recovery, Role of Back-up in Recovery, Data-Recovery solution.

Evidence Collection and Data Seizure: Importance of Collecting Evidence, Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination- The Chain of Custody.

UNIT – III: INITIAL RESPONSE, FORENSIC DUPLICATION AND FORENSIC TOOLS (12 periods)

Initial Response and Volatile Data Collection from Windows system, Initial Response and Volatile Data Collection from UNIX system.

Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic Duplicate/Qualified Forensic Duplicate of a Hard Drive, Live Data Collection for Systems (Windows and UNIX).

Forensic Tools: Forensic Card Reader, Cell Seizure, MOBILedit, Forensic SIM, WinHex.

UNIT -IV: COMPUTER FORENSIC ANALYSIS (11 periods)

Data Analysis and Validation: Determining the data to collect and analyze, Validating forensic data, Addressing data, hiding techniques, performing remote acquisitions.

Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime, Preparing for a search, Seizing Digital Evidence at the Scene, Storing Digital Evidence.

UNIT – V: FORENSICS AREAS AND REPORT WRITING (12 periods)

Cell Phone and Mobile Device Forensics: Understanding Mobile Device Forensics, Acquisition Procedures for Cell Phones and Mobile Devices.

Network Forensics: Overview, Performing Live Acquisitions, Developing Standard Procedure for Network Forensics, Investigating Routers, Network Tools.

E-Mail Investigation: Exploring the role of E-Mail in investigations, Investigating E-Mail Crimes and Violations.

Report Writing: Understanding the importance of Reports, Guidelines for Writing Reports, Generating Report Findings with Forensics Software Tools.

Case Study: Perform the Forensic process on a File system or on an external storage device to ensure the integrity or loss of data using any open source Forensic Tool.

Total periods: 55

TEXT BOOKS:

1. John R. Vacca, *"Computer Forensics, Computer Crime Scene Investigation"*, Firewall Media, 2009.

2. Bill Nelson, Amelia Phillips, Christopher Steuart, *"Guide to Computer Forensics and Investigations"*, Cengage Learning, 4th Edition, 2009.

REFERENCE BOOKS:

1. Chris Prosise, Kevin Mandia, *"Incident Response and Computer Forensics"*, McGraw-Hill Osborne Media, 2nd Edition, July 2003.

2. Nina Godbole, Sunit Belapure, "*Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*", Wiley India Pvt Ltd, 2011.

3. EoghanCasey,"*Handbook Computer Crime Investigation's Forensic Tools and Technology"*, Academic Press, 2001.

4. Peter Stephenson, Keith Gilbert, "*Investigating Computer Related Crime*", CRC Press, 2nd Edition, 2004.

MCA IV-Semester

16MC40110: WIRELESS NETWORKS

(Professional Elective – II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on *"Computer Networks".*

COURSE DESCRIPTION:

Concepts of Medium access alternatives; Generations of Wireless WANS; Adhoc and Wireless Sensor Networks; Wireless MANS and PANS.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on
- Wireless WANS
- Wireless LANS
- Adhoc and Sensor Networks and
- Wireless MANS and PANS

CO2. Analyze the sensor and Adhoc network models and its classifications.

CO3. Design and develop Network applications for Wireless devices like smart phones and tablets.

CO4. Solve complex connectivity problems - Security, Quality of service and routing optimization at in wireless Networks.

CO5. Select and apply the latest wireless network protocols - LTE, Wi-Fi and Bluetooth in developing and operating wireless networks.

CO6. Provide innovative privacy and security measures for accessing of Wireless Network devices adapting standards- IEEE 802.11, IEEE 802.11b and IEEE 802.11.

DETAILED SYLLABUS:

UNIT- I : MULTIPLE RADIO ACCESS (11 Periods)

Medium Access Alternatives: Fixed-Assignment for Voice Oriented Networks, Random Access for Data Oriented Networks, Handoff and Roaming Support, Security and Privacy.

UNIT -II : WIRELESS WANS (11 Periods)

First Generation Analog, Second Generation TDMA – GSM, Short Messaging Service in GSM, Second Generation CDMA – IS-95, GPRS - Third Generation Systems (WCDMA/CDMA 2000).

UNIT- III: WIRELESS LANS (11 Periods)

Introduction to wireless LANs - IEEE 802.11 WLAN – Architecture and Services, Physical Layer- MAC sublayer- MAC Management Sublayer, Other IEEE 802.11 standards, HIPERLAN, WiMax standard.

UNIT- IV: ADHOC AND SENSOR NETWORKS (11 Periods)

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

UNIT- V: WIRELESS MANS AND PANS (11 Periods)

Wireless MANs – Physical and MAC layer details, Wireless PANs – Architecture of Bluetooth Systems, Physical and MAC layer details, Standards.

Total Periods: 55

TEXT BOOKS:

1. William Stallings, "*Wireless Communications and networks*," Pearson Education, 2nd Edition, 2007.
2. Dharma Prakash Agrawal and Qing-An Zeng, "*Introduction to Wireless and Mobile Systems*," Thomson India Edition, 2nd Edition, 2007.

REFERENCE BOOKS:

1. Vijay. K. Garg, "*Wireless Communication and Networking*," Morgan Kaufmann Publishers, 2007.
2. Kaveth Pahlavan, Prashant Krishnamurthy, "*Principles of Wireless Networks*," Pearson Education Asia, 2002.
3. Gary. S. Rogers and John Edwards, "*An Introduction to Wireless Technology*," Pearson Education, 2007.

MCA – IV Semester

16MC4HS31: SOFT SKILLS LAB

(Professional Elective – II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "English Language Lab".

COURSE DESCRIPTION:

Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire knowledge on:

- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyse the functional knowledge on

- Body Language
- Interpersonal Skills and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal situations.

LIST OF EXERCISES:

1. Body Language
2. Assertiveness
3. Goal Setting
4. Creative Thinking
5. Interpersonal Skills
6. Team Work
7. Conflict Management

8. Etiquette

9. Report Writing

10. Resume Writing

11. Group Discussions

12. Interviewing Skills

Total Lab Slots: 10

REFERENCE BOOKS:

5. R. C. Sharma & Krishna Mohan, "*Business Correspondence and Report Writing*," Tata McGraw-Hill Publishing Company Limited, Third Edition, New Delhi, 2012.
6. Gopalswamy Ramesh and Mahadevan Ramesh, "*The Ace of Soft Skills*," Pearson, Noida, 2010.
7. Jeff Butterfeild, "*Soft Skills for Everyone*," Cengage learning, Delhi, 2011.
8. Barun K. Mitra, "*Personality Development and Soft Skills*," Oxford University Press, Noida, 2012.

SUGGESTED SOFTWARE:

1. ETNL Language Lab Software Version 4.0

2. GEMS – Globarena E- Mentoring System

3. Speech Solutions.

4. English Pronunciation Dictionary by Daniel Jones.

5. Learning to Speak English 8.1, The Learning Company – 4 CDs.

6. Mastering English: Grammar, Punctuation and Composition.

7. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.

8. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.

9. Language in Use 1, 2 and 3.

10. Cambridge Advanced Learner's Dictionary - 3rd Edition.

11. Centronix – Phonetics.

12. Let's Talk English, Regional Institute of English South India.

13. Ultimate English Tutor.

MCA IV-SEMESTER

14MC4HS01: BUSINESS COMMUNICATION AND PRESENTATION SKILLS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

PRE-REQUISITES:--

COURSE OBJECTIVES:

I. To impart knowledge of business communication and presentation skills.
II. To hone communication, career and presentation skills for professional practice and management.
III. To apply the acquired skills in real time professional environment.
IV. To enhance self confidence and instill apt attitude and flair for life- long learning.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Broaden their knowledge of business communication, career and presentation skills.
2. Identify requirements of various business scenarios and analyze appropriate professional mode of interaction to be adopted.
3. Apply the acquired skills in real time scenarios of professional context.
4. Function effectively as a member or a leader in teams and multidisciplinary settings with expertise in public speaking and presentation skills.
5. Communicate effectively in interviews, group discussions and business communication.
6. Passionately involve in independent and life-long learning of evolving professional communication.

DETAILED SYLLABUS

UNIT – I: NATURE AND SCOPE OF COMMUNICATION (10 Periods)

Introduction - Functions of Communication - Roles of a Manager - Communication Basics - Communication Networks - Informal Communication - Tips for Effective Internal Communications - Interpersonal Communication - Communication Barriers - Effective Managerial Communication - Strategies for Improving Organizational Communication.

UNIT – II : NON-VERBAL COMMUNICATION (10 Periods)

Introduction - Significance of Non-verbal Communication in Organizations - Forms of Non-verbal Communication - Types of Non-verbal Communication - Cross Cultural Communication: Introduction - Concept of Cross cultural Communication - Different Communication Styles - Cross-cultural Communication Strategies - Corporate Communication: Introduction - Crisis Management / Communication - Case Study.

UNIT – III : WRITING BUSINESS DOCUMENTS (10 Periods)

Business Writing: Introduction - Importance of Written Business Communication - Five Main Stages of Writing Business Messages; Business Letter Writing: Common Components of Business Letters - Strategies for Writing the Body of a Letter - Kinds of Business Letters; Business Reports - Kinds of Reports - Characteristics of Business Reports - Steps in Writing a Routine Business Report - Corporate Reports.

UNIT – IV : BUSINESS PRESENTATIONS AND PUBLIC SPEAKING (10 Periods)

Introduction - Business Presentations Speeches - Introduction to a presentation - Main Body - Conclusion - Effective Sales Presentations - Case Study; Group Discussions: Introduction - Work Place GD Guidelines - Functional and Non-functional Roles in Group Discussions; Team Presentations: Benefits of Team Presentations - Purpose of Team Presentations - Case Studies.

UNIT – V : CAREERS AND RESUME (10 Periods)

Introduction - Career Building: Understanding Yourself - Setting a Career Goal - Résumé Writing: Résumé Formats; Interviews: Introduction - Fundamental Principles of Interviewing - General Preparation for an Interview - Success in an Interview - Types of Interviewing Questions - Important Non-verbal Aspects - Types of Interviews - Styles of Interviewing - Case Interviews.

Total Periods:50

TEXT BOOK

1. Business Communication, Meenakshi Raman and Prakash Singh, Oxford University Press, New Delhi, Second Edition, 2012.

REFERENCES

1. *Business Communication*, M K Sehgal and Vandana Khetarpal, Excel Books, New Delhi, 2011.
2. *Effective Technical Communication*, M Ashraf Rizvi, Tata McGraw–Hill, 2009.
3. *Business Communication*, P D Chaturvedi and Mukesh Chaturvedi, Pearson Education Pvt. Ltd, New Delhi, 2006.
4. *Business Communication*, R K Madhukar, Vikas Publishing House Pvt Ltd., 2005.

MCA IV-SEMESTER

16MC40131: BIG DATA ANALYTICS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A Course on "Big Data Analytics".

COURSE DESCRIPTION:

Installation of Hadoop; Perform analytics on Weather sensors application; Analysis of reports in R and HIVE Tool.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- MapReduce Framework
- R programming

CO2. Analyze Structured, unstructured and semi-structured types of data to perform data analytics.

CO3. Design and develop Map Reduce programs on Hadoop platform for weather sensor data.

CO4. Solve complex problems in Big Data by adopting appropriate techniques to provide insights to facebook datasets.

CO5. Apply modern tools such as HIVE and R to perform analytics in a user friendly environment.

CO6. Communicate effectively in implementing social network data sets for analysis using R tool with respect to visualization of hidden patterns.

CO7. Asses the Weather sensors applications with respect to local or global climatic conditions.

CO8. Demonstrate knowledge as an individual to manage OLA dataset on R and HIVE to handle diverse data.

LIST OF EXERCISES:

1. Setting up and Installing Hadoop to handle Big data.

2. Set up a pseudo-distributed, single-node Hadoop cluster backed by the Hadoop Distributed File System, running on Ubuntu Linux.

After successful installation on one node, configuration of a multi-node Hadoop cluster (one master and multiple slaves).

3. Implement the following file management tasks in Hadoop:

a) Adding files and directories b) Retrieving files c) Deleting files

- Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
5. Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.
6. Implement Matrix Multiplication with Hadoop Map Reduce
7. Perform setting up and Installing R studio.
8. Implement R scripts to perform sorting and grouping of data.
9. Implement R scripts to perform joining, projection, and filtering of data.
10. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.
11. Unstructured data into NoSQL data and do all operations such as NoSQL query with API.

REFERENCE BOOKS:

1. Tom White, "*Hadoop: The Definitive Guide,*" Oreilly and Yahoo press, 3rd Edition, 2012.
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, and Marcia Kaufman, "*Big Data for Dummies*," John Wiley & Sons, Inc., 2013.
3. Frank J. Ohlhorst, "*Big Data Analytics: Turning Big Data into Big Money*," Wiley Publication, December 2012.

MCA IV-Semester

16MC40132: LINUX AND WEB PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Linux Programming" and "Web Programming".

COURSE DESCRIPTION:

HTML, Java Script**,** XML and Shell Script; Web Application Development using Servlets, Java Server Pages, PHP and JDBC; Tomcat Server and XAMP Server for Deploying Web Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on:

- Client side scripting
- AJAX programming and Application Servers
- HTML, DHTML**,** Java Script and XML

CO2. Analyze 2-tier, 3-tier and MVC architectures for web application development.

CO3. Design and develop web Applications using Dynamic HTML with Java Script, XML technology.

CO4. Investigate and solve complex problems using Server-side technologies like servlets, JDBC technologies and adapt Tomcat Server and XAMPP Server for deployment.

CO5. Use JSP and PHP to implement E-Commerce applications that has potential insights.

CO6. Communicate effectively in implementing web application programs using HTML, JAVA script and AJAX.

CO7. Develop societal, environmental and health related applications using Servlets, JSP and PHP.

CO8. Work with diverse teams using web technology frameworks towards developing quality software applications.

LIST OF EXERCISES:

1. a. Develop static pages of an online Book Store using HTML (the pages should resemble: www.amazon.com). The website should consist of the following pages.

   i. Home Page

   ii. Registration and User Login

   iii. Books Catalog

b. Validate the Registration and User Login pages using JavaScript.

2. a. Programs using XML Schema, XSLT/XSL

   b. Program using DOM / SAX.

3. a. Filtering utilities

   b. Networking utilities

4. Write a basic servlet program that must display information like

   a. Request method used by the client and

   b. Current system date

5. a. Write a shell script that copies multiple files to a directory.

   b. Write a shell script (small calculator) that adds, subtracts, multiplies and divides the given two integers. There are two division options: one returns the quotient and the other returns reminder. The script requires 3 arguments: The operation to be used and two integer numbers. The options are add (-a), subtract (-s), multiply (-m), quotient (-c) and reminder (-r)

6. a. Write a JSP program for finding total number of visitors in a site to keep track of active users at a given instance of time, and also display the user session starting time.

   b. Write a JSP program that creates a cookie on username which is send from html file and display the cookie value as a response. The cookie must be active based on the maximum active interval time.

7. a. Write a shell script that counts the number of lines and words present in a given file.

   b. Write a shell script that displays the list of all files in the given directory.

8. Develop java program for following SQL operations using JDBC.

   i. Create

   ii. Insert

   iii. Update and

   iv. Delete

Consider the following schema:

Employee (EmpName, EmpNo Primary Key, Department, Salary)

9. a. Write a shell script to generate a multiplication table.

   b. Write a shell script to reverse the rows and columns of a matrix.

10. Generate a JSP page that will retrieve the Employee information from the database. The page should display the employee records in a tabular format.

11. Implement in C the following UNIX commands using system calls.

    i) cat ii) ls iii) mv

12. a. Write a PHP program to demonstrate GET and POST method of passing the data between pages.

    b. Write a PHP program to demonstrate Array, Key-pair values.

    c. Write a PHP program to read and write the Data from the Database.

13. **Minor Project:** Design and develop an online library management system using Model View Controller (MVC) architecture.

REFERENCE BOOKS:

1. Kogent Learning Solutions Inc., "*Web Technologies Black Book",* Dreamtech Press, 2011.

2. Steven Holzner, *"The Complete Reference PHP"*, Tata McGraw-Hill Education Pvt. Ltd., 2007.

MCA IV - Semester
14MC40121: WEB PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	--	--	3	2

PRE-REQUISITES:
A course on "Object Oriented Programming through JAVA"

COURSE OBJECTIVES:

I. To provide fundamental knowledge on Web, Architectures, Application Servers and various technologies like HTML, DHTML and XML for web application development.
II. To understand different web application programming languages like Servlets, JSP and PHP.
III. To analyze the requirements for the development of web applications.
IV. To design and develop an efficient and user friendly web application.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Acquire Knowledge in various web related concepts and technologies like client side scripting, validation of forms and AJAX programming.
2. Ability to analyze user requirements and selection of suitable web components for the development of web applications.
3. Apply prototyping technique and architectures to design dynamic, scalable, platform independent and enterprise web applications.
4. Demonstrate skills by applying security and management principles for effective implementation of web applications.
5. Adapt tools like Apache Tomcat Server and XAMPP Control Panel for implementing Web Applications.

LIST OF LAB PROGRAMS:

1. Develop static pages of an online Book Store by only using HTML (the pages should resemble: www.amazon.com). The website should consist the following pages.
    i. Home Page
    ii. Registration and User Login
    iii. Books Catalog
2. a. Design and develop a Feedback form using JavaScript.
   b.Validate the Registration and User Login pages of program – 1.
3. Create a web page with all types of Cascading style sheets.
4. Create and save an XML document at the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
5. Programs using XML Schema, XSLT/XSL
6. Program using DOM / SAX.
7. a. Write a java program to get IP Address, Host Name and Port Numbers of a Local System

b. Write a Java Program using Datagram Communication.

8. Write a basic Servlet program that must display information like
    a. Request method used by the client and
    b. Current system date
9. Generate JSP pages to
    a. Current system date
    b. Page should include two files (either html or jsp files) by using include directive.
    c. Page should include two files (either html or jsp files) by using include action.
    d. Any mathematical table by using Scriptlet Elements (Declaration, Expression and Scriptlet tags).
    e. Page must perform forward action.
10. Write a JSP program for finding total number of visitors in a site to keep track of active users at a given instance of time, and also display the user session starting time.
11. Write a JSP program that creates a cookie on username which is send from html file and display the cookie value as a response. The cookie must be active based on the maximum active interval time.
12. Develop java program for following SQL operations using JDBC.

v. Create
vi. Insert
vii. Update and
viii. Delete

Consider the following schema:

Employee (EmpName, EmpNo Primary Key, Department, Salary)

13. Generate a JSP page that will retrieve the Employee information from the database. The page should display the employee records in a tabular format.
14. a. Write a PHP program to demonstrate GET and POST method of passing the data between pages.
    b. Write a PHP program to demonstrate Array, Key-pair values.
    c. Write a PHP program to read and write the Data from the Database.
15. a. Implementing the OOPs concept in PHP.
    b. Create a PHP page that uses Session and cookies.
    c. File Handling in PHP.

REFERENCE BOOKS:

1. Kogent Learning Solutions Inc., "*Web Technologies Black Book",* Dreamtech Press, 2011

MCA – V Semester

16MC50101: CLOUD COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: Courses on "Computer Networks" and "Operating Systems".

COURSE DESCRIPTION:

Virtualization, Cloud Computing Fundamentals, Deployment Models; Cloud Computing Architecture; Cloud Computing Mechanisms; Cloud Security; Cloud Disaster Recovery; Working with Clouds; and Case Studies.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on services, architecture, types of infrastructural models, disaster recovery and Virtualization.

CO2. Analyze the issues in cloud computing Data, Network and Host security.

CO3. Apply API development skills in web applications for Cloud deployment.

CO4. Use research based knowledge to build cloud applications.

CO5. Use advanced programming languages to access cloud services.

CO6. Build cloud environment suitable for societal requirements.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTAL CLOUD COMPUTING (10 Periods)

Understanding Cloud Computing: Origins and Influences, Basic Concepts and Terminology, Goals and Benefits, Risks and Challenges.

Fundamental Concepts and Models: Roles and Boundaries, Cloud Characteristics, Cloud Delivery Models, Cloud Deployment Models.

UNIT-II: CLOUD COMPUTING MECHANISMS AND ARCHITECTURE (11 Periods)

Cloud-Enabling Technology: Broadband Networks and Internet Architecture, Data Center Technology, Virtualization Technology, Web Technology, Multitenant Technology, Service Technology.

Fundamental Cloud Architectures: Architecture - Workload Distribution, Resource Pooling, Dynamic Scalability, Elastic Resource Capacity, Service Load Balancing, Cloud Bursting, Elastic Disk Provisioning, Redundant Storage.

UNIT-III: CLOUD COMPUTING ADVANCED ARCHITECTURES (12 Periods)

Advanced Cloud Architectures: Architecture-Hypervisor Clustering, Load Balanced Virtual Server Instances, Non-Disruptive Service Relocation, Zero Downtime, Cloud Balancing,

Resource Reservation, Dynamic Failure Detection and Recovery, Bare-Metal Provisioning, Rapid Provisioning, Storage Workload Management.

Specialized Cloud Architectures: Architecture - Direct I/O Access, Direct LUN Access, Dynamic Data Normalization, Elastic Network Capacity, Cross-Storage Device Vertical Tiering, Intra-Storage Device Vertical Data Tiering, Load Balanced Virtual Switches, Multipath Resource Access, Persistent Virtual Network Configuration, Redundant Physical Connection for Virtual Servers, Storage Maintenance Window.

UNIT-IV: CLOUD SECURITY AND DISASTER RECOVERY (11 Periods)

Cloud Security: Data security, Network security, Host security, Cloud Security Services and Cloud Security Possible Solutions.

Cloud Disaster Recovery: Disaster Recovery Planning, Disasters in the Cloud, Disaster Management, Capacity Planning and Cloud Scale.

UNIT-V: CLOUD SERVICE MODELS AND CASE STUDIES (11 Periods)

Cloud Service Models: Software as a Service (SaaS)- Characteristics, Examples and Applications. Platform as a Service (PaaS)- Characteristics, Examples and Applications. Infrastructure as a Service (IaaS)- Characteristics, Examples and Applications.

Case Studies: SaaS: Salesforce.com, Facebook.com; PaaS: Google App Engine, MS-Azure and IBM Bluemix; IaaS: Amazon EC2, Amazon S3 and Netflix.

Total Periods: 55

TEXT BOOKS:

1. Thomas Erl and RicardoPuttini **"***Cloud Computing- Concepts, Technology & Architecture,"* Pearson Publication, 2013.
2. George Reese "Cloud Application Architectures", O'Reilly Publications, 2009.

REFERENCE BOOKS:

1. Barrie Sosinsky, *"Cloud Computing Bible",* Wiley India Pvt. Ltd, 2011.
2. Rajkumar Buyya, James Broberg and Andrzej Goscinski, *"Cloud computing principles and paradigms*", John Wiley and Sons, 2011.
3. John W. Rittinghouse, James F. Ransome, *"Cloud Computing implementation, Management and Security*", CRC Press, Taylor and Francis group, 2010.

MCA V-Semester

14MC50103: CLOUD COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

PRE-REQUISITES:

Courses on "Computer Networks" and "Database Management System".

COURSE OBJECTIVES:

I. To provide knowledge on importance of Cloud computing, Cloud Security, Disaster Recovery and Cloud vendors.
II. To acquire skills on Virtualization Technologies such as VMware, Hyper-V.
III. To apply knowledge & skills of Cloud Computing programming in developing service oriented applications.
IV. To create attitude for maintaining security in different Cloud based applications.

COURSE OUTCOMES:

1. Acquire knowledge on services and types of infrastructural models in Cloud.
2. Gain problem solving to assess & improve quality attributes security, privacy concerns, and performance in Cloud Computing.
3. Apply the Cloud Architectures while developing the Web Applications.
   Design & Deploy common standard principles, practices, and methods for building Cloud based applications.
4. Inculcate ethical code of conduct in performing professional activities such as Storage, Services and Deploying of Cloud Computing applications.

DETAILED SYALLABUS

UNIT-I: INTRODUCTION TO VIRTUALIZATION (10 Periods)

Virtualization: Introduction to Virtualization, objectives of virtualization, benefits of virtualized technology, Adding guest Operating system.
Virtualization Technologies: Ubuntu, VMware, Microsoft Hyper-V.

UNIT-II: DEFINING CLOUD COMPUTING (11 Periods)

Defining Cloud Computing: Defining Cloud Computing, Cloud Types - The NIST model, The Cloud Cube Model, Deployment models, Service models, Examining the Characteristics of Cloud Computing, Paradigm shift, Benefits of cloud computing, Disadvantages of cloud computing, Assessing the Role of Open Standards.
Assessing the Value Proposition: Measuring the Cloud's Value, Early adopters and new applications, The laws of cloudonomics, Cloud computing obstacles, Behavioral factors relating to cloud adoption, Measuring cloud computing costs, Avoiding Capital Expenditures, Right-sizing, Computing the Total Cost of Ownership, Specifying Service Level Agreements, Defining Licensing Models.
Understanding Cloud Architecture: Exploring the Cloud Computing Stack, Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications, Connecting to the Cloud, The Jolicloud Netbook OS, Chromium OS: The Browser as an Operating System.

UNIT-III: UNDERSTANDING SERVICES AND APPLICATIONS BY TYPE (11 Periods)

Understanding Services And Applications By Type : Defining Infrastructure as a Service (IaaS), IaaS workloads, Pods, aggregation, and silos, Defining Platform as a Service (PaaS), Defining Software as a Service (SaaS), SaaS characteristics, Open SaaS and SOA, Salesforce.com and CRM SaaS, Defining Identity as a Service (IDaaS), What is an identity? Networked identity service classes, Identity system codes of conduct, IDaaS interoperability Defining Compliance as a Service (CaaS).

Understanding Abstraction and Virtualization: Using Virtualization Technologies, Load Balancing and Virtualization, Advanced load balancing, The Google cloud Understanding Hypervisors, Virtual machine types, VMware vSphere, Understanding Machine Imaging, Porting Applications, The Simple Cloud API, AppZero Virtual Application Appliance.

Capacity Planning: Capacity Planning, Defining Baseline and Metrics, Baseline measurements, System metrics, Load testing, Resource ceilings, Server and instance types, Network Capacity, Scaling.

UNIT-IV: EXPLORING PLATFORM AS A SERVICE (11 Periods)

Exploring Platform as a Service: Defining Services, Salesforce.com versus Force.com: SaaS versus PaaS, Application development, Using PaaS Application Frameworks, Drupal, Eccentex AppBase 3.0, LongJump, Squarespace, WaveMaker, Wolf Frameworks.

Using Google Web Services: Exploring Google Applications, Surveying the Google Application Portfolio, Indexed search, The dark Web, Aggregation and disintermediation, Productivity applications and services, Enterprise offerings, AdWords, Google Analytics, Google Translate, Exploring the Google Toolkit, The Google APIs, Working with the Google App Engine.

Using Amazon Web Services: Understanding Amazon Web Services, Amazon Web Service Components and Services, Working with the Elastic Compute Cloud (EC2), Amazon Machine Images, Pricing models, System images and software, Creating an account and instance on EC2, Working with Amazon Storage Systems, Amazon Simple Storage System (S3), Amazon Elastic Block Store (EBS), CloudFront, Understanding Amazon Database Services, Amazon SimpleDB, Amazon Relational Database Service (RDS), Choosing a database for AWS.

UNIT-V: USING MICROSOFT CLOUD SERVICES (11 Periods)

Using Microsoft Cloud Services: Exploring Microsoft Cloud Services, Defining the Windows Azure Platform, The software plus services approach, The Azure Platform, The Windows Azure service, Windows Azure AppFabric, Azure Content Delivery Network, SQL Azure, Windows Azure pricing, Windows Live services, Using Windows Live, Windows Live Essentials, Windows Live Home, windows live for mobile.

Managing the Cloud: Administrating the Clouds, Management responsibilities, Lifecycle management, Cloud Management Products, Emerging Cloud Management Standards, DMTF cloud management standards, Cloud Commons and SMI.

Understanding Cloud Security: Securing the Cloud, The security boundary, Security service boundary, Security mapping, Securing Data, Brokered cloud storage access, Storage location and tenancy, Encryption, Auditing and compliance, Establishing Identity and Presence, Identity protocol standards, Windows Azure identity standards, Presence.

Total Periods: 54

TEXT BOOKS:

1. Barrie Sosinsky, *"Cloud Computing Bible,"* Wiley India Pvt Ltd, 1st Edition, 2011.
2. Ivanka Menken Ivanka Menken, *"Cloud Computing Virtualization Specialist Complete Certification Kit - Study Guide Book",* Emereo Publishing, 2nd Edition, 2012.

REFERENCE BOOKS:

1. Anthony T. Velte, Toby J. Velte Robert Elsenpeter, *"Cloud Computing: A practical Approach"*, Tata Mc Graw Hill, ISBN: 9780071626941,2010.
2. John W. Rittinghouse, James F. Ransome, *"Cloud Computing implementation, Management and Security"*, CRC Press, ISBN: 9788120341609, Taylor & Francis group, 2010.
3. George Reese, *"Cloud Application Architectures",* Oreilly publishers, 1st Edition, 2010.
4. David S. Linthicum, *"Cloud Computing and SOA Convergence in your Enterprise",* Addison- Wesley, 2010.

MCA V-SEMESTER

16MC50103: SOFTWARE TESTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION:

Software Testing Basics: Goals, Defects, Terminology, Methodology, STLC in SDLC, Verification and Validation; Software Testing Techniques: White box testing, Black Box Testing, Regression testing; Test Management: Test Planning, Design and Specifications; Test Automation: Tool selection and Guidelines.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Software Testing Life Cycle.
- Testing Techniques.
- Test Management and Metrics.
- Regression Testing
- Test Automation

CO2. Analyze testing circumstances and their resultants in software development.

CO3. Design and develop the appropriate test cases in accordance to the software development model.

CO4. Use problem solving skills to control and monitor the testing process.

CO5. Apply testing tools for testing the software quality.

CO6. Apply contextual knowledge to perform testing on software related to societal applications.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO SOFTWARE TESTING (10 periods)

Evolution of Software Testing, Software Testing—Myths and Facts, Goals of software testing, Psychology for software testing, Software testing definitions, Model for software testing, Effective software testing vs. exhaustive software testing, Effective testing is hard, Software testing as a process.

Terminology and Methodology: Software testing terminology, Software Testing Life Cycle (STLC), Software testing methodology.

UNIT-II: TESTING TECHNIQUES (12 periods)

White Box Testing

Need of white-box testing, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, Data flow testing, Mutation testing.

Black Box Testing

Boundary Value Analysis (BVA), Equivalence class testing, State table-based testing, Decision table-based testing, Cause-effect graphing based testing, Error guessing.

UNIT-III: SOFTWARE TEST MANAGEMENT AND METRICS (11 periods)

Test Management: Test organization, Structure of testing group, Test planning, detailed test design, Test specifications.

Software Metrics: Definition of software metrics, Classification of software metrics, Size metrics.

Efficient Test Suit Management: Minimizing Test Suite and its Benefits, Test Suit Minimization problem, Test suite Prioritization, Types of Test case prioritization, Prioritization Techniques.

UNIT-IV: REGRESSION AND AUTOMATION (10 periods)

Static Testing: Inspections, Walkthroughs, Technical reviews.

Regression Testing: Progressive vs. regressive testing, Regression testing produces quality software, Regression testability, Objectives of regression testing, Regression testing types, Defining regression test problem, Regression testing techniques.

Automation and Testing Tools: Need for automation, Categorization of testing tools, Selection of testing tools, Costs incurred in testing tools, Guidelines for automated testing, Overview of some commercial testing tools.

UNIT -V: TESTING FOR SPECIALIZED ENVIRONMENTS AND FUNCTIONAL TEST TOOL (12 Periods)

Testing for specialized Environment: Object-oriented Testing software and web-based software, challenges in testing for web-based software, testing of web-based systems.

Functional Test Tool: Overview of Functional test tool (UFT/RFT/Selenium), Test Recording, Test Running, Synchronization of test cases, creating checkpoints, testing with parameterization.

Total Periods: 55

TEXT BOOK:

1. Naresh Chauhan, "Software Testing: Principles and Practices," Oxford University Press, 2nd Edition, 2016.

REFERENCE BOOKS:

1. Boris Beizer, "Software Testing Techniques," Dream Tech Press, 2nd Edition, 2004.
2. Dr. K. V. K. K. Prasad, "Software Testing Tools," Dreamtech, 2004.

MCA V-SEMESTER

14MC50102: SOFTWARE TESTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

PRE-REQUISITES:
A course on "Software Engineering"

COURSE OBJECTIVES:

I. To introduce the students about the importance of testing, methods and various test types.
II. To enrich the need for automated software testing tools.
III. To test the various applications requirements like functional, non-functional using automated test tools.

COURSE OUTCOMES:
On successful completion of this course the students will be able to:

1. Analyze the problem definitions by using the system requirement specifications.
2. Design and develop various test condition and test cases for unit, integration, system test level.
3. Apply various research methodologies on testing approaches, bug reporting.
4. Apply different automated testing tools like QTP, LoadRunner, Rational Functional Tester.
5. Create detailed test cases and an effective test plan.
6. Test code as well as artifacts in a better way.

DETAILED SYLLABUS

UNIT – I: TESTING METHODOLOGY (9 Periods)

Introduction to software Testing: Introduction, Evolution of software Testing, Software Testing-Myths and Facts, Goals of software Testing, Software testing definitions Effective software Testing Vs Exhaustive Software Testing, Software Testing as a process
Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life cycle (STLC), Software Testing Methodology.

UNIT – II: TESTING TECHNIQUES (10 Periods)

Dynamic Testing: Black-box Testing Techniques: Boundary Value Analysis (BVA), Equivalence Class Testing, State Table-based testing, Decision table-based testing, cause-effect Graphing Based testing.
White-box Testing Techniques: Need of white-box testing, Logic coverage criteria, basis path testing**,** Loop testing, Data flow testing, Mutation Testing.

UNIT – III: STATIC TESTING, SOFTWARE METRICS & NEED FOR AUTOMATION (9 Periods)

Static Testing: Inspections, Walkthroughs, Technical reviews.
Software Metrics: Definition of software metrics, Classification of software metrics, Entities to be measured, Size metrics.

Need for Automation: Introduction, Categorization of Testing tools, selection of testing tools, costs incurred in testing tools, Guidelines for automated testing.

UNIT -IV: TESTING FOR SPECIALIZED ENVIRONMENTS AND FUNCTIONAL TEST TOOL (14 Periods)

Testing for specialized Environment: Object-oriented Testing software and web-based software, challenges in testing for web-based software, Testing of web-based systems.
Functional Test Tool: Overview of Functional test tool (QTP/RFT/Selenium), Test Recording, Test Running, Synchronization of test cases, creating checkpoints, testing with parameterization.

UNIT – V: REGRESSION TESTING AND PERFORMANCE TEST TOOL (12 Periods)

Regression Testing: Progressive vs. regressive Testing, Objectives of Regression Testing, When is Regression testing Done? Regression testing types, Defining regression Test problem, Regression testing techniques
Performance Test Tool: Overview of performance test tool (LoadRunner/ OpenSTA/ Load UI), Creating Vuser script using virtual user Generator, Creating virtual users using Load Controller**.**

Total periods: **54**

TEXT BOOKS:

1. Naresh Chauhan, "*Software testing principles and practices*," Oxford higher education,2010.
2. Dr. K.V.K.K Prasad, "*Software Testing tools*," Dreamtech Press, Reprint Edition, 2007.

REFERENCE BOOK:

1. Boris Beizer, "*Software Testing techniques,"* Dreamtech Press, second edition, 2006

MCA V – Semester

16MC50104: SOFTWARE QUALITY ASSURANCE

(Professional Elective – III)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Software Engineering".

COURSE DESCRIPTION:

Software Quality; Software Quality Assurance; Project Life Cycle components; Software Quality Infrastructure; Development Methodologies; Procedures and Work Instructions; Standards, Certificates and assessments.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on quality, architecture, metrics of software development.

CO2. Analyze software quality plan for a software project to include sections on change management, configuration management, defect elimination, validation and verification and measurement.

CO3. Design software quality plans for a software project and asses their capability to adopt quality standards.

CO4. Assess the quality of software product using software quality metrics.

CO5. Adapt Procedures and work instructions, Templates, Checklists and 3S development for software quality infrastructure.

CO6. Commit to ethics to apply ISO and IEEE standards in preparing the quality plan and documents.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO SOFTWARE QUALITY AND ARCHITECTURE

(10 Periods)

Need for Software quality, Quality challenges, Software quality assurance (SQA) - Definition and objectives; Software quality factors, McCall's quality model, SQA system - an SQA architecture, Software Project life cycle Components; Pre project quality components - Development and quality plans.

UNIT II: SQA COMPONENTS AND PROJECT LIFE CYCLE (11 Periods)

Software Development methodologies, Quality assurance activities in the development process, Verification and Validation, Reviews, Software Testing, Software Testing implementations, Quality of software maintenance - Pre Maintenance of software quality components, Quality assurance tools; CASE tools for software quality, Software maintenance quality, Project Management.

UNIT III: SOFTWARE QUALITY INFRASTRUCTURE (11 Periods)

Procedures and work instructions , Templates , Checklists, 3S development , Staff training and certification, Corrective and preventive actions, Configuration management - Software change control, Configuration management audit; Documentation control - Storage and retrieval.

UNIT IV: SOFTWARE QUALITY MANAGEMENT AND METRICS (11 Periods)

Project progress control - Computerized tools, Software quality metrics - Objectives of quality measurement, Process metrics, Product metrics, Implementation, Limitations of software metrics; Cost of software quality - Classical quality cost model, extended model, Application of Cost model.

UNIT V: STANDARDS, CERTIFICATIONS AND ASSESSMENTS (12 Periods)

Quality management standards- ISO 9001 and ISO 9000-3, capability Maturity Models, CMM and CMMI assessment methodologies , Bootstrap methodology, SPICE Project; SQA project process standards- IEEE standard 1012 and 1028; Organization of Quality Assurance - Department management responsibilities, Project management responsibilities; SQA units and other actors in SQA systems.

Total Periods: 55

TEXT BOOK:

1. Daniel Galin, "*Software Quality Assurance: From Theory to Implementation"*, Pearson Publication, 2004.

REFERENCES:

1. Alan C. Gillies, "*Software Quality: Theory and Management*", International Thomson Computer Press, 1997.

2. Mordechai Ben, Menachem "*Software Quality: Producing Practical Consistent Software*", International Thompson Computer Press, 1997.

MCA – V Semester

16MC50105: SEMANTIC WEB

(Professional Elective – III)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Web Programming" and "Computer Networks".

COURSE DESCRIPTION: Semantic web fundamentals; Semantic web technology; Ontology web language; Swoogle; Semantic web services.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Semantic web search
- RDF and SWOOGLE
- Semantic web services
- RDFS and OWL

CO2. Analyze layers of web architecture for describing web content.

CO3. Design semantic web search engine for capturing information on the current web

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO SEMANTIC WEB (10 periods)

The world of the semantic web: WWW, Internet usage, Meta data, Search Engine for traditional web and Semantic Web, Web Page Markup Problem, "Common Vocabulary"-Problem, Query-Building Problem.

UNIT-II: SEMANTIC WEB TECHNOLOGY (11 periods)

Resource Description Framework (RDF), Rules of RDF, Aggregation-Distributed information, core elements of RDFS, Ontology and Taxonomy, Inference based on RDF schema, RDF relationship with DL, XML, and RDF tools.

UNIT-III: WEB ONTOLOGY LANGUAGE –OWL (11 periods)

Web Ontology Language (OWL), Define Classes: Localize Global Properties, Set Operators and Enumeration, Define properties; Ontology Matching and Distributed Information , OWL ontology Header, Camera Ontology in OWL, Three Faces of OWL, Validating OWL ontology.

UNIT-IV: SWOOGLE (12 periods)

Swoogle Architecture, FOAF, Semantic markup, Issues, prototype system, Design of Semantic web search engine, Discovery and indexation strategy, usage of prototype system, Prototype Search Engine Performance.

UNIT-V: SEMANTIC WEB SERVICES (11 periods)

Need for Semantic Web Services Semantic web services and applications, OWL-S: Upper ontology, Building blocks, Validating OWL-S document semantics, WSDL-S, OWL-S to UDDI mapping, Matchmaking Engines, Design of the search engine and implementations.

Total Periods: 55

TEXT BOOK:

1. Liyang Yu, *"Introduction to the Semantic Web and Semantic web services,"* Chapman and Hall/CRC, Taylor & Francis group, 2007.

REFERENCE BOOKS:

1. Johan Hjelm*, "Creating the Semantic Web with RDF,"* Wiley, 2001
2. Grigoris Antoniou and Frank van Harmelen, *"A Semantic Web Primer",* MIT Press, 2004.

MCA IV – Semester

14MC40110: SEMANTIC WEB

(ELECTIVE-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

PRE-REQUISITES:

A Course on "Data Warehousing and Data Mining"

COURSE OBJECTIVES:

I. To understand principles of Semantic Web as an extension of the existing World Wide Web.
II. To acquire knowledge on Web Intelligence and Knowledge Representation for the Semantic Web.
III. To design and develop web ontology language for machines to understand hyperlinked information.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Provide for the fine-grained mixing of diverse metadata.
2. Identify relevant domains for Semantic Web Applications, Services and Technology.
3. Design and develop universal medium for the exchange of structured data and Synthesize information to find, share and combine into a Semantic Web.
4. Investigate the impact of semantic web over Social Networks.
5. Adapt tools like RDF, XML, RDFS and OWL for Ontology Engineering over a specific domain.

DETAILED SYLLABUS:-

UNIT-I: WEB INTELLIGENCE (10 Periods)

Web Intelligence: Empowering the information Age-Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT-II: KNOWLEDGE REPRESENTATION FOR THE SEMANTIC WEB (11Periods)

Knowledge Representation For The Semantic Web: Resource Description Framework (RDF)-XML Language, RDF Language, Basic elements, RDF Schema. Ontology Web Language-Ontology language, Ontology Language requirements, Compatibility of OWL and RDF/RDFs, OWL language, elements, OWL Eample, Ontology Example, Applying OWL, OWL capabilities and Limitations.

UNIT-III: ONTOLOGY ENGINEERING (11 Periods)

Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic and Inference, Monotonic and Nonmonotonic Rules, Description Logic, Inference Engines, RDF Inference Engine.

UNIT-IV: SEMANTIC WEB APPLICATIONS, SERVICES AND TECHNOLOGY (11 Periods)

Web Applications, Services And Technology: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

UNIT-V: SOCIAL NETWORK ANALYSIS AND SEMANTIC WEB (12 Periods)

Social Network Analysis and Semantic Web: Social Networks analysis, development of the social networks analysis, Key Concepts and measures in network analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

Total Periods: 55

TEXT BOOKS:

1. Berners Lee, Godel and Turing, "*Thinking on the Web*," 2nd Edition, Wiley India, 2009.

2. Peter Mika, "*Social Networks and the Semantic Web*," Springer, 2007

REFERENCE BOOKS:

1. J.Davies, Rudi Studer and Paul Warren, "*Semantic Web Technologies, Trends and Research in Ontology Based Systems,"* JohnWiley & Sons, 2006.
2. Heiner Stuckenschmidt and Frank Van Harmelen, "*Information sharing on the semantic Web,"* Springer Publications, 2005.

MCA – V Semester

16MC50109: BIOINFORMATICS

(Professional Elective – IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: --

COURSE DESCRIPTION: Bioinformatics; Biology and Information; DNA and RNA; biological databases; Sequence alignment and dynamic programming; database mining tools; usages of Bioinformatics.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on

- Biological database.
- Bioinformatics.
- DNA and RNA.
- Modern molecular biology

CO2. Analyze DNA and RNA Structure, Public Databases-NCBI and global and local sequence alignments on biological DBMS.

CO3. Design and implement

- Data retrieval.
- Data annotation.
- Database Connectivity

CO4. Investigate on sequence alignment function and retrieve structure and Evolutionary information using dynamic programming.

CO5. Select and apply techniques and data mining tools on biological data to perform Sequence similarity search using tools like BLAST and FASTA.

DETAILED SYLLABUS:

UNIT- I: BIOLOGY AND INFORMATION (11 periods)

Bioinformatics - Maturing Science, Genes to Proteins, Bioinformatics in the public domain; Computers in Biology and Medicine- Computational Tools- Limitations of Computational Tools; Virtual Doctor- Mapping the human Brain; Biological Macromolecules as Information Carriers.

UNIT- II: DNA and RNA (10 periods)

DNA and RNA Structure, DNA Cloning and Sequencing, Genes, Taxonomy and Evolution

Automated Procedure: DNA Sequencing, Method of Genome Sequencing Access from Databases-ENTREZ.

UNIT-III: BIOLOGICAL DATABASES (11 periods)

Biological Databases Organization: Database content and Management, Data submission, Growth of Public Databases, Data Retrieval, Data Annotation and Database Connectivity.

Public Databases: National Center for Biotechnology Information (NCBI).

UNIT-IV: SEQUENCE ALIGNMENT AND DYNAMIC PROGRAMMING (12 periods)

Alignment of Pairs of Sequence:

Introduction to sequence alignment, Definition of Sequence alignment, Sequence alignment Reveal function, Structure and Evolutionary information.

Dynamic Programming: Principal methods of Pair wise sequence alignment- Dot matrix method, Finding sequence Repeats, Finding Repeats of a Single sequence symbols, Dynamic programming methods for sequence alignment.

UNIT-V: DATABASE MINING TOOLS (11 periods)

Database Mining Tools: Sequence similarity search tools- BLAST and FASTA; Overview of Database sequence searching, Pattern Recognition tools, Multiple Alignment and Phylogenetic Tree Analysis.

Total Periods: 55

TEXT BOOKS:

1. Hooman H. Rashidi and Lukas K. Buehler, "*Bioinformatics Basics, Applications in Biological Science and Medicine*", CRC Press, Taylor & Francis Group, 2nd Edition, 2005.
2. David W.Mount "*Bioinformatics: Sequence and Genome Analysis*", Cold Spring Harbor Laboratory (CSHL) press, 2nd Edition, 2005.

REFERENCE BOOK:

1. C S V Murthy," *Bioinformatics*", Himalaya Publishing House, 2003.

MCA – V Semester

16MC50110: ETHICAL HACKING

(Professional Elective – IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Computer networks".

COURSE DESCRIPTION:

Network and Computer Attacks; Foot Printing and Social Engineering; Port Scanning; Enumeration; Desktop and Server Operating System vulnerabilities; Hacking Web Servers; Cryptography; Network Protection System; Hacking Wireless Network.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on:

- Network and Computer attacks
- OS Vulnerabilities
- Hacking web servers, Hacking wireless network

CO2. Analyze system and network vulnerabilities.

CO3. Design security solutions for risks that arise from hacking.

CO4. Use appropriate ethical hacking technique to solve security problems.

CO5. Apply Contextual Knowledge to assess safety and legal issues in ethical hacking.

CO6. Inculcate use of ethical hacking practices while maintaining professional ethics.

DETAILED SYLLABUS:

UNIT-I: ETHICAL HACKING OVERVIEW, NETWORK AND COMPUTER ATTACKS

(11 periods)

Ethical Hacking Overview: Ethical hacking, Certification programs for network security personnel, Hacker Vs Cracker.

Network and Computer Attacks: Malicious software, Protection against malware, Intruder attacks on networks and computers, addressing physical security.

UNIT-II: FOOTPRINTING AND SOCIAL ENGINEERING, PORT SCANNING

(10 periods)

Footprinting and Social Engineering: Using web tools for footprinting, Conducting competitive intelligence, Using domain name system zone transfers, Introduction to social engineering.

Case Study: Social Engineering.

Port Scanning: Port scanning, Using port scanning tools, Conducting ping sweeps, Understanding scripting.

UNIT-III: ENUMERATION , OS VULNERABILITIES (11 periods)

Enumeration: Enumeration, Enumerating windows operating systems, Netware operating system and Unix operating system.

Desktop and Server OS Vulnerabilities: Windows OS vulnerabilities, Tools for identifying vulnerabilities in windows, Best practices for hardening windows systems, Linux OS vulnerabilities.

UNIT-IV: HACKING WEB SERVERS, HACKING WIRELESS NETWORK (12 periods)

Hacking Web Servers: Understanding web applications, Web application vulnerabilities, Tools for web attackers and Security testers.

Hacking Wireless Network: Understanding wireless technology, Wireless network standards, Authentication, War driving, Wireless hacking.

UNIT-V: CRYPTOGRAPHY, NETWORK PROTECTION SYSTEM (11 periods)

Cryptography: Understanding cryptography basics, Substitution and Transposition ciphers, DES, Cryptography attacks.

Network Protection System: Understanding routers, Firewalls, Intrusion detection and prevention systems, Honeypots.

Total Periods: 55

TEXT BOOK:

1. Michael T. Simpson, Kent Backman and James E. Corley, "*Hands-On Ethical Hacking and Network Defense*," Cengage Learning, 2013.

REFERENCE BOOKS:

1. Kimberly graves, *"CEH Official Certified Ethical Hacker Review Guide,"* Wiley Publications, 2007.
2. Michael Gregg, *"Certified ethical hacker (CEH) Cert guide,"* Pearson Education, 2014.

MCA V-Semester

16MC50111: MULTIMEDIA AND RICH INTERNET APPLICATION DEVELOPMENT

(Professional Elective – IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Web Programming".

COURSE DESCRIPTION:

Concepts of Multimedia; Multimedia authoring tools; Data representations; Fundamental concepts in Video and digital audio; Basic video compression techniques; Multimedia communication and retrieval; Development of rich internet applications with adobe flash.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on multimedia, video compression techniques and adobe flash.

CO2. Analyze a variety of creative techniques like sequential, hierarchical search and MPEG in the visual design of online media.

CO3. Design and development of Multimedia Animations using Adobe Flash and Flex3

CO4. Create highly interactive, rich internet applications using multimedia technologies and authoring tools.

CO5. Evaluate the role and importance of critical experimentation and innovation in the multimedia development process as a professional practice.

DETAILED SYLLABUS:

UNIT- I: MULTIMEDIA AUTHORING AND DATA REPRESENTATIONS (10 periods)

Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

UNIT- II: FUNDAMENTAL CONCEPTS IN VIDEO AND DIGITAL AUDIO (11 periods)

Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio. Multimedia Data Compression: Lossless compression algorithms, Lossy compression algorithms, Image compression standards.

UNIT-III: BASIC VIDEO COMPRESSION TECHNIQUES (11 periods)

Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG video coding I- MPEG-1 and 2, Basic Audio Compression Techniques: ADPCM in Speech Coding, G.726 ADPCM, Vocoders.

UNIT-IV: MULTIMEDIA COMMUNICATION AND RETRIEVAL (12 periods)

Basics of Computer and Multimedia Networks, Multiplexing Technologies, LAN and WAN, Access Networks. Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-On- Demand (MOD).

UNIT-V: RICH INTERNET APPLICATIONS (RIAS) WITH ADOBE FLASH (11 periods)

Adobe Flash Introduction, Flash Movie Development, Learning Flash with Hands-on Examples, Publish your flash movie, creating special effects with Flash, Creating a website splash screen, action script. Rich Internet Applications (RIAs) with Flex3 Introduction, Flex Platform Overview, Creating a Simple user Interface.

Total Periods: 55

TEXT BOOKS:

1. Ze-Nian Li, and Mark S. Drew, "*Fundamentals of Multimedia*", Pearson Education, 2008.
2. Paul J Deitel and Harvey M Deitel, "*AJAX Rich Internet Applications, and Web Development for Programmers*", Deitel Developer Series, Pearson Education, 2009.

REFERENCE BOOKS:

1. Nigel Chapman, and jenny chapman, "*Digital Multimedia"*, Wiley-*Dreamtech, 2005*

2. Russel Chun, "*Flash CS3 Professional Advanced*", Pearson Education, 2007.

MCA V - Semester

14MC50111: MULTIMEDIA APPLICATION DEVELOPMENT

(ELECTIVE –IV)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	--	3

PRE-REQUISITES:

A course on **"**Web Programming".

COURSE OBJECTIVES:

I. To provide fundamental knowledge on visualization and web design skills.
II. To analyze the requirements for the development of multimedia applications.
III. To design and develop a website from the perspective of visual designer.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Acquire Knowledge in various web related concepts and technologies like java script, validation of forms and action script programming.
2. Analyze the role and importance of critical experimentation and innovation in the development process and multimedia application.
3. Apply a variety of creative techniques like sequential, hierarchical search and MPEG in the visual design of online media.
4. Demonstrate competency with graphic software, scanning and digital photography to create original images.

DETAILED SYLLABUS

UNIT- I: MULTIMEDIA AUTHORING AND DATA REPRESENTATIONS (11 Periods)

Multimedia Authoring and Data Representations: Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

UNIT-II: ACTION SCRIPT (12 Periods)

Action Script: Core Concepts, Conditionals and Loops, Instance Methods Revisited, Static Variables and Static Methods, Functions, Inheritance, Compiling and Running a program, Data types and Type Checking, Interfaces.

UNIT-III: DISPLAY AND INTERACTIVITY (12 Periods)

Display and Interactivity: Events and Event Handling, Exceptions and Error Handling**,** Dynamic Action Script, Scope**,** Events and Display Hierarchies, Interactivity. Screen Updates, Programmatic Animation, Drawing with Vectors, Bitmap Programming, Text Display and Input.

UNIT-IV: BASIC VIDEO COMPRESSION TECHNIQUES (10 Periods)

Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG video coding I- MPEG-1 and 2, Basic Audio Compression Techniques: ADPCM in Speech Coding, G.726 ADPCM, Vocoders.

UNIT-V: MULTIMEDIA COMMUNICATION AND RETRIEVAL (10 Periods)

Multimedia Communication and Retrieval: Computer and Multimedia Networks**:** Basics of Computer and Multimedia Networks, Multiplexing Technologies, LAN and WAN, Access Networks. Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-On- Demand (MOD).

Total Periods: 55

TEXT BOOKS:

1. Ze-Nian Li, and Mark S. Drew*," Fundamentals of Multimedia"*, Pearson Education, 2008.
2. Colin Moock, SPD O, REILLY*, "Essentials ActionScript 3.0"*, 1st Edition, 2007.

REFERENCE BOOKS:

1. Nigel chapman, and jenny chapman, "*Digital Multimedia"*, Wiley-Dreamtech, 2005.
2. Fred Halsall, "*Multimedia Communications: Applications, Networks, Protocols and Standards"*, Pearson Education, 2001.

MCA – V Semester

16MC50131: CLOUD COMPUTING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Cloud Computing".

COURSE DESCRIPTION:

Hands-on experience on creating virtual machines on Windows and Linux platforms; Development of service based web applications and their deployment and Mobile app development.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate hands-on experience on Virtualization models and Cloud Environment.

CO2. Analyze the given experiment and relate to existing architectures.

CO3. Apply API development skills in web applications for cloud deployment.

CO4. Demonstrate independent problem solving skills in developing dynamic web applications.

CO5. Use advanced programming languages to access cloud services.

CO6. Demonstrate communication skills, both oral and written for preparing and presenting reports.

CO7. Build suitable cloud environment for societal requirements.

CO8. Work effectively as an individual and as a member in team for mini-project implementation.

LIST OF EXERCISES:

1. Create VM's with given set of configuration on Hyper-V Ubuntu 14LTs files with 2GB RAM and 200GB Hard Disk through Infrastructure Services (IaaS).
2. Create Virtualization on VMware Windows 7 OS with 4GB RAM and 500GB Hard Disk" through Infrastructure as a Service (IaaS).
3. Develop a simple web application for student details and operative using Salesforce.com in Cloud Platform under Software as Service (SaaS).
4. Develop a simple web application for personal Homepage, Attributes, Controllers, GUI, Visual Page, Forms, and Templates under Software as Service (SaaS).

5. Develop a web application for performing calculator operations be selecting relevant serviced. Deploy this application on Salesforce.com Cloud Platform under Software as Service (SaaS).
6. Develop a web application on IBM Bluemix Cloud Platform for executing application using Eclipse under Platform as a Service.
7. Create virtual machine instance with given set of configuration on Amazon web Services (AWS) under Infrastructure as a Service (IaaS).
8. Create virtual machine instance with set of configuration on Amazon S3 (Simple Storage Service) in Amazon Web Service (AWS) under Infrastructure as a Service (IaaS).
9. Develop a web application on IBM Bluemix Cloud Platform for implementing IoT application.
10. Develop a calculator web based application on MS-Azure Platform i.e. Platform as a Service (PaaS).
11. Develop a student home page web based application on MS-Azure Platform i.e. Platform as a Service (PaaS) Cloud.
12. Develop a mobile app on Google App Engine for uploading a resume into a website, collaborated with Drop box. The resume should be encrypted. (PaaS)
13. Develop a service call to run on Drop box resumes for picking the resumes of given skill set. (PaaS)
    i. 6+ years of Exp in Java Development.
    ii. 10 years of experience in Automation Testing.
    iii. 15+ years of Managerial experience with technical background.
    iv. 5-7 years of on-site experience in .NET support and programming.

REFERENCE BOOKS:

1. Barrie Sosinsky, *"Cloud Computing Bible*,**"** Wiley India Pvt Ltd, 2011.
2. Rajkumar Buyya, James Broberg and Andrzej Goscinski, **"***Cloud computing principles and paradigms,"* John Wiley and Sons, 2011.
3. Thomas Erl and RicardoPuttini *"Cloud Computing- Concepts, Technology & Architecture*,**"** Pearson, 2013.
4. John W. Rittinghouse, James F. Ransome, *"Cloud Computing implementation, Management and Security,***"** CRC Press, Taylor & Francis group, 2010.