



# **University of Pune**

**Faculty of Engineering**

**Master of Computer Applications (MCA)**

**Revised Syllabus WEF from year 2013**

**Under Computer Engineering Board of Studies**

### Course Structure for MCA (Computer Engineering) (Course 2013)

Subject Code	Subject	Teaching Scheme Hrs/Week		Examination Scheme						Credits
		Lect.	Pract	Paper		Tw	Or	PR	Marks	
				Int	Ext					
<b>FYMCA SEM — I</b>										
310901	C and C++ Programming	4	—	30	70	—	—	—	100	4
310902	Computer Organization	4	—	30	70	—	—	—	100	4
310903	Principles of Programming Practices	4	—	30	70	—	—	—	100	4
310904	Discrete Mathematics	4	—	30	70	—	—	—	100	4
310905	Probability & Statistics	4	—	30	70	—	—	—	100	4
310906	Business Communications	01	01	—	—	50	—	—	50	2
310907	C & C++ Laboratory	—	4	—	—	50	—	50	100	2
310908	Open Source Tools Laboratory	—	4	—	—	50	—	50	100	2
	<b>Total</b>	<b>21</b>	<b>09</b>	<b>150</b>	<b>350</b>	<b>150</b>	<b>--</b>	<b>100</b>	<b>750</b>	<b>26</b>
	<b>Total Workload in hours</b>									<b>390</b>
Subject Code	Subject	Teaching Scheme Hrs/Week		Examination Scheme						Credits
		Lect.	Pract	Paper		Tw	Or	PR	Marks	
				Int	Ext					
<b>FYMCA SEM — II</b>										
310909	Java Programming	4	—	30	70	—	—	—	100	4
310910	Data Structures using C	4	—	30	70	—	—	—	100	4
310911	Web Technologies	4	—	30	70	—	—	—	100	4
310912	System Analysis & Design	4	—	30	70	—	—	—	100	4
310913	Management Theory & Practices	4	—	30	70	—	—	—	100	4
310914	Web Technologies Laboratory	01	01	—	—	50	—	—	50	2
310915	Java Programming Laboratory	—	4	—	—	50	—	50	100	2
310916	Data Structures Lab	—	4	—	—	50	—	50	100	2
	<b>Total</b>	<b>21</b>	<b>09</b>	<b>150</b>	<b>350</b>	<b>150</b>	<b>--</b>	<b>100</b>	<b>750</b>	<b>26</b>
	<b>Workload in hours</b>									<b>390</b>

**Note:** Term work will be assessed continuously during the semester internally by a pair of examiners appointed by the head of the Institution. Practical/Oral examination will be conducted at the end of the semester by a pair of examiners with one internal and one external examiner appointed by the University.

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		Lect.	Pract	Paper		Tw	Or	PR	Marks	
				Int	Ext					
<b>SYMCA SEM — III</b>										
410901	Advanced Java	4	—	30	70	—	—	—	100	4
410902	DBMS	4	—	30	70	—	—	—	100	4
410903	Operating Systems	4	—	30	70	—	—	—	100	4
410904	OOAD	4	—	30	70	—	—	—	100	4
410905	Operations Research	4	—	30	70	—	—	—	100	4
410906	HBASE Lab		4	—	—	50	—	50	100	2
410907	Advance Java Lab		4	—	—	50	—	50	100	2
410908	UML Lab – umbrella	01	01	—	—	50	—		50	2
	<b>Total</b>	<b>21</b>	<b>09</b>	<b>150</b>	<b>350</b>	<b>150</b>	<b>--</b>	<b>100</b>	<b>750</b>	<b>26</b>
	<b>Workload in hours</b>	<b>390</b>								
Subject Code	Subject	Teaching Scheme Hrs/Week		Examination Scheme						Credits
		Lect.	Pract	Paper		Tw	Or	PR	Marks	
				Int	Ext					
<b>SYMCA SEM — IV</b>										
410909	Advanced Web Technology	4	—	30	70	—	—	—	100	4
410910	Banking and FAM	4	—	30	70	—	—	—	100	4
410911	CN & Information Security	4	—	30	70	—	—	—	100	4
410912	<b>Elective I</b>	4	—	30	70	—	—	—	100	4
410913	Adv DBMS	4	—	30	70	—	—	—	100	4
410914	WT Lab		4	—	—	50	—	50	100	2
410915	Advance DBMS Lab		4	—	—	50	—	50	100	2
410916	Network & Security Lab	01	01	—	—	50	—		50	2
	<b>Total</b>	<b>21</b>	<b>09</b>	<b>150</b>	<b>350</b>	<b>150</b>	<b>--</b>	<b>100</b>	<b>750</b>	<b>26</b>
	<b>Workload in hours</b>	<b>390</b>								

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**Course Structure for MCA (Computer Engineering) (Course 2013)**

Subject Code	Subject	Teaching Scheme Hrs/Week		Examination Scheme						Credits
		Lect.	Pract	Paper		Tw	Or	PR	Marks	
				Int	Ext	Int	Ext	Ext		
<b>TYMCA SEM — V</b>										
510901	Recent Technologies in IT	4	—	30	70	—	—	—	100	4
510902	Software Testing and Quality Assurance	4	—	30	70	—	—	—	100	4
510903	Software Engineering	4	—	30	70	—	—	—	100	4
510904	Data warehousing, data mining and BI	4	—	30	70	—	—	—	100	4
510905	Elective - II	4	—	30	70	—	—	—	100	4
510906	RTIT Lab	—	4	—	—	50	—	50	100	2
510907	STQA Lab	—	4	—	—	50	—	50	100	2
510908	Mini Project #1	01	01	—	—	50	—	—	50	2
	<b>Total</b>	<b>21</b>	<b>09</b>	<b>150</b>	<b>350</b>	<b>150</b>	<b>--</b>	<b>100</b>	<b>750</b>	<b>26</b>
	<b>Workload in hours</b>	<b>390</b>								
Subject Code	Subject	Teaching Scheme Hrs/Week		Examination Scheme						
		Lect.	Pract	Paper		Tw	Or	PR	Marks	
				Int	Ext	Int	Ext	Ext		
<b>TYMCA SEM — VI</b>										
510909	Major Project	6	—	150	200	—	—	—	350	16
510910	Seminar on Domain of Major Project #2	4	—	50	—	—	—	—	50	4
	<b>Total</b>	<b>10</b>	<b>—</b>	<b>200</b>	<b>200</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>400</b>	<b>20</b>

**Note:** Term work will be assessed continuously during the semester internally by a pair of examiners appointed by the head of the Institution. Practical/Oral examination will be conducted at the end of the semester by a pair of examiners with one internal and one external examiner appointed by the University.

**#1:** Mini project is to be carried out in a group of 4 students. Each group will be assigned a guide. At the end of the term the students should submit 2 copies of the report in a prescribed format provided by the institute duly signed by the guide and the head of the department. Staff members of the institute will assess the mini project Internally.

**#2:** The seminar topic must be selected in consultation with institute guide. Each student will make the seminar presentation in the term making use of audio/video aids for the duration of 30-35 minutes and submit two copies of the seminar report in a prescribed format provided by the host institution duly signed by the guide and the head of the department. Attendance for all seminars for all students is compulsory. Staff members of the institute will assess the seminars internally.

**Project workload calculation: 6 Hours/ week/ student**

Project work is to be carried out either individually or in a group. Each group will be assigned a guide. At the end of the term the student should submit at least two copies of the project report in a prescribed format. Examination will be carried out by a pair of examiners for each group with one internal and one external examiner appointed by the University.

**Electives:**

Elective I	Elective II
1. IS Audit	1. Animation & Gaming
2. Cyber Laws	2. Mobile Computing
3. IT Governance	3. High Performance Networks
4. IT Service Management	4. Open Elective

**Procedure for offering Open Elective:**

Open elective proposal can be offered with Industry partner. A proposal with syllabus, (Program educational Outcomes) PEO's be forwarded to the Chairman BOS, before June / December every year. Approved syllabus through appropriate procedure can be taught in various colleges. Industry person and Teacher appointed together conduct the course.

**Total Credits = 150**

**Breakup of Credits –**

1. For Semester I to Semester V, 26 Credits per Semester making total of 130 Credits
2. For Semester VI which contains Seminar & Full time Project, 20 Credits.

**Examination Pattern:**

MCA (Engineering 2013) will follow the Exam pattern consisting of 70 marks University Examination and 30 marks Internal College Evaluation. Each theory paper will have 6 units and on each unit there will be 2 questions asked – one of which is to be answered by the MCA student.

The student can have maximum 10 heads of backlog papers while taking admission to next year. The student will not be allowed to take admission to next year if S/he has failed in more than 10 subjects.

All laboratory tools must be Multi-core, 64 bit computers with Windows 7 or Windows 8 or Fedora 18 or equivalent with 64-bit tools (Software/Hardware)

Lateral Entry (if any): As per Norms and Guidelines.

FYMCA Admission: As per Norms and Guidelines.

## 310901: C & C++ PROGRAMMING

### Teaching Scheme:

Lectures: 4 Hrs/Week

### Examination Scheme:

Theory: 70 Marks

### Course Description and Objective:

It is assumed that students entering in MCA (Engineering) comes has basic computer background and already they have completed C. if not bridge course has to kept for those students.

**Purpose of UNIT – I, II & III** is to give quick walk-through the C and has to be emphasized on in-depth concepts of C. It will provide strong foundation for 'Data Structure & File (Sem-2) to covered in next semester. After completing first year students will be equipped with necessary technical skills required and expected by most of the company for their final placement purpose

**Purpose of UNIT – IV, V, and VI** is to explain advantage of C++ over C and concepts of OOP. It will be foundation of other Object Oriented programming languages to be covered in further semesters. i.e. Core Java (Sem-2), Adv Java etc.

### UNIT – I

(8 Hrs)

Introduction to the Programming Language. Need, Advantages and limitations of C Language. Compiling, Debugging and running a C Program without and with IDE. What is header files & creating our own header file.

### UNIT – II

(8 Hrs)

Data Types and Variables, Operators, Control-flow Statements, Looping Statements, Arrays, Strings, Pointers, Structures & Union, Dynamic Memory Allocation.

### UNIT – III

(8 Hrs)

Modular Programming with Functions. Call By Value & Call By Reference. The C Standard Library Functions. The C Preprocessor and the #include and #define Directives. Macro definition and uses.

### UNIT – IV

(8 Hrs)

Concept of Object Oriented Programming. Difference between C & C++. OOP and it advantages. Standard input and standard output operators. Defining Classes in C++, data members & member function, instantiating and Using Classes. Exception Handling, Constructor and Destructor - Using Constructors, Multiple Constructors and Initialization, Copy Constructor, Using Destructor to Destroy Instances,

### UNIT – V

(8 Hrs)

Inheritance and Polymorphism - Defining Base and Derived Classes. Access Modifiers – private, public and protected. Overloading and Overriding, Operator Overloading (arithmetic operators only)

Virtual Function & Polymorphism, Friend Function, Static Function, this Pointer

### UNIT – VI

(8 Hrs)

Introduction to File Handling using c & c++. File Input/output, Command-line arguments, Text file & Binary files. ifstream, ofstream, istream, ostream and fstream classes and their hierarchy. Input and output operation - open() ,get(), getline(), read(), seekg() and tellg() AND put(), seekp(), tellp(), and write() functions.

## 310902: COMPUTER ORGANIZATION

### Teaching Scheme:

Lectures: 4 Hrs/Week

### Examination Scheme:

Theory: 70 Marks

### Objectives:

1. To understand the structure, function and characteristics of computer systems
2. To understand the design of the various functional units of digital computers
3. To learn basics of Parallel Computer Architecture.

**UNIT I (8 Hrs) Introduction to Digital Computer :** Concept of Digital Computer, Types of Software – System software / Application software / Utility Software., Compilers, Interpreters, Assemblers, Linker, Loader

### Data Representation and Boolean Algebra

Binary, Octal, Hexadecimal and their inter-conversion, 1's and 2's complement.

Binary Arithmetic. & Number Systems – BCD, EBCDIC, ASCII, De-Morgan's Theorem, Duality Theorem, K-Map, Sum of product, Product of Sum, Algebra Rules, Laws, Logic Circuits, NOT, AND, OR, NAND, NOR, XOR, XNOR, Gated diagrams.

### UNIT II

(8 Hrs)

### Combinational Circuits & Sequential Circuits

Half / Full Adder , Decoder / Encoder , Multiplexer / Demultiplexer, Flip Flops - SR, D, JK, Master – Slave, Edge Triggered D flip-flop with timing diagram. Shift Registers (Any one type), Introduction to Counters, Synchronous & Asynchronous counter, Binary counter, mod-10 counter

### UNIT III

(8 Hrs)

### Memory System

Memory Hierarchy, Primary Memory – DRAM, SDRAM, DDR, RDRAM. ROM, PROM, EPROM, EEPROM, Cache memory Structure, DMA, DMA interfacing with processor

### UNIT IV

(8 Hrs)

### CPU Organization

CPU Building Blocks, CPU Registers, System bus Characteristics, Interface basics with interface block diagram, concept of local bus with name of different local buses (only types). Addressing Modes, Interrupt Concept, Interrupt types, Instruction and Execution cycle, Hardwired and Micro Program control, RISC vs. CISC , Pipelining – Data Path, Time Space Diagram, Hazards

### UNIT V

(8 Hrs)

### Processor Architecture

Components of Microprocessor, 16-bit (8086) Architecture, Super scalar Concept. Pentium Processor Architecture

### UNIT VI

(8 Hrs)

### Multi-Processor Organization

Parallel Processing, Concept and Block Diagram, Types (SISD, SIMD, MIMD, MISD), Future Directions for Parallel Processors, Performance of Processors, Clusters Concept, Cluster Architecture.

### Text Books:

1. Computer System Architecture Morris Man, Pearson, 3rd Edition.
2. Introduction to Digital Computer Design V. Rajaraman & Radhakrishnan, PHI
3. Computer Organization and Architecture W. Stalling, Pearson, 8th Edition

### Reference Books:

1. Computer Organization & Design Pal Chaudhary, PHI, 3rd Edition
2. Microprocessor Architecture Ramesh Gaonkar, Penram International Publishing, 6th Edition.
3. Intel Micro Processors Barry Brey, Pearson, 7th Edition

## Teaching Scheme:

Lectures: 4 Hrs/Week

## Examination Scheme:

Theory: 70 Marks

### Objectives:

1. To develop analytical and logical thinking and problem solving capabilities.
2. To develop understanding of how a programming problem is recognized and how a solution to the problem can be designed
3. To develop understanding of how programs can be tested.
4. To develop understanding of how programs can be documented.

### Unit 1:

(4 hrs)

#### Introduction

What is software? What is Hardware? Relationship between Software and Hardware, Types, Logical system architecture, Acquiring software, and Software development steps, Firmware, **Computer Languages:** Analogy with natural language, machine language, Assembly Language, High-Level language, Object Oriented Programming languages,

### Unit 2:

(8 Hrs)

#### Problem Solving Concepts

General Problem solving concepts, Types of problems-Computational, logical, repetitive, problems solving with computers, Difficulties with problem solving, Problem Solving aspects, Problem solving concepts for computer- constant and variables, data types, functions, operators, expression and equations, How the computer stores data(volatile memory, file, buffer), Communicating with a computer, Organizing the problem, Analyzing the problem, Developing the program structure, Specifying module input/output, Writing the algorithms, Documenting your solution, Testing your solution.

### Unit 3:

(8 hrs)

#### Programming structure

Introduction to programming structure, modular programming, top down/bottom up design approach, modules and their function cohesion and coupling, logical and global variable, parameters, return values, variable names and data dictionary, naming conventions, Implementation of Sequential, selection and iterative structures, Recursive approach

### Unit 4: Algorithms

(12 hrs)

Notations of Flow Charts and its implementation, Top-Down-step wise refinement, Implementation of algorithms, Program Verification, Efficiency of algorithms, Analysis of algorithm,

**Basic Algorithms:** Exchange of values of two variables with or without third variable, Summation of set of numbers, Factorial Computation, Sine function computation, Generation of Fibonacci Sequence, Reversing of digits of an integer, Base conversions, Character to Number conversion, Finding Square Root, smallest divisor, Factorial, GCD, Generating Prime numbers, prime factors of integers, pseudo random number generation, Pascal triangle, Perfect number.

### Unit 5: Analysis of Algorithms

(8 hrs)

Introduction of analysis of an algorithm, frequency count and its importance of analysis of an algorithm, Time complexity and space complexity of algorithm, big O,  $\Phi$ ,  $\Omega$  notations, how to estimate running time of an algorithm- counting number of iterations, counting the frequency of basic operations, using recurrence relation, Best, worst and average case analysis using some of the above examples.



**Unit 6: Algorithm using Array****(8 hrs)**

Processing Array- one dimensional, multidimensional arrays, table lookup technique, pointer technique, Array technique- Maximum and minimum of array, reversing of an array, mean and median of n-numbers, Row major and column major form of array representation,

**Sorting and searching**

Linear search, binary search, Insertion sort, bubble sort, selection sort.

**System Implementation and Operation:** Testing and debugging, Documentation, Changeover to new system, System evolution, System maintenance, Business data processing: What is data processing? Standard methods of organizing data, File management system, Database management system

# 310904: DISCRETE MATHEMATICS

**Teaching Scheme:**  
Lectures: 4 Hrs/Week

**Examination Scheme:**  
Theory: 70 Marks

## **Objectives:**

To study discrete objects and relationships among them  
To demonstrate how these concepts can be applied to solve nontrivial real life problems

### **Unit I (8 Hrs)**

Introduction: History of mathematics as related to discrete structure, motivations for discrete Structure, Sets: introduction, combination of sets, finite and infinite sets, unaccountably infinite sets, Mathematical induction, Principle of inclusion/exclusion (addition principle)

### **Unit II (8 Hrs)**

Propositional Calculus: Propositions, logical connectives, truth table, methods of proof using inference rules: equivalence and implications, universal and existential quantifiers, propositional calculus

### **Unit III (8 Hrs)**

Permutations and Combinations: Rules of sum and products, permutations, combinations, generations of permutations and combinations

### **Unit IV (8 Hrs)**

Relations and Functions: Definitions, properties of binary relation, equivalence relation, partial ordering relations, definition of a function, pigeonhole principle

### **Unit V (8 Hrs)**

Graphs and Planer graphs: Basic terminology, multigraphs and weighted graphs paths and Circuits, shortest path in weighted graphs, Hamiltonian and Eulerian paths and circuits

### **Unit VI (8 Hrs)**

Trees and cut sets: Trees, rooted trees, path lengths in rooted trees, prefix code, binary search trees, spanning trees and cutsets, minimal spanning trees

## **Text Books:**

1. J. Tremblay, Manohar R., "Discrete Mathematical Structures with application to Computer Science", Tata McGraw-Hill, 2002 ISBN 0-07-463113-6
2. Deo N., "Graph theory with application to Engineering and Computer Science", Prentice Hall of India, 1990, ISBN 0 – 87692 – 145 – 4

## **Reference Books:**

1. LIU C., "Elements of Discrete Mathematics", 2nd Edition, Tata McGraw-Hill, 2002, ISBN 0-07-043476-X.
2. B. Kolman, R. Busby and S. Ross, "Discrete Mathematical Structures", 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9
3. Johnsonbaugh R., "Discrete Mathematics", 5th Edition, Pearson Education, 2001 ISBN 81-7808- 279-9
4. Goodaire E., Parmenter M., "Discrete Mathematics with Graph Theory", 2nd Edition, Pearson Education, 2003 ISBN 81 – 7808 – 827 – 4
5. Biggs N., "Discrete Mathematics", 2nd Edition, Oxford, 2002 ISBN 0 – 19 – 850717 - 8

## 310905: PROBABILITY AND STATISTICS

### Teaching Scheme

Lectures: 4 Hrs/Week

### Examination Scheme:

Theory: 70 Marks

### Objectives:

1. To provide an introduction to probability and statistics

### UNIT 1: Introduction

(8 Hrs)

Interpretation of probability, sample space and events, permutations and combinations, permutations of indistinguishable objects, Binomial Theorem, Multinomial Theorem, Axioms of probability, conditional probability, Multiplication Rule, Bayes' Theorem,

### UNIT 2: Discrete Distributions

(8 Hrs)

Random Variables, Discrete probability densities, cumulative Distribution, mathematical Expectations, Mean, Variance, Standard Deviation, Moment Generating Function, Geometric Distribution, Binomial Distribution, Negative Binomial Distribution, Hyper Geometric Distribution, Poisson Distribution.

### UNIT 3: Continuous Distributions

(8 Hrs)

Continuous Random Variable and Probability Density, Cumulative Distribution, Expected Value, Mean and Variance, Uniform Distribution, Gamma Function, Gamma Distribution, Exponential Distribution, Chi-squared Distribution, Normal Distribution, Standard normal Distribution, Weibull Distribution and reliability, Reliability of series and parallel systems, Joint Distributions, Joint Density and Marginal Density (Discrete and Continuous), Independence, Expectation and Covariance, Correlation, Conditional Densities and Regression.

### UNIT 4:

(8 Hrs)

Descriptive Statistics: Random Sampling, Sample Statistics, Location Statistics, measures of Variability. Estimation: Point Estimation, Methods of moments and maximum likelihood estimation, Functions of random Variables -Distribution of sample mean, Interval Estimation, Confidence Interval on the mean with Variance known, Central Limit Theorem.

### UNIT 5:

(8 Hrs)

Interval Estimation of Variability, Estimating the Mean and Student-t Distribution, Hypothesis Testing, Significance Testing, Hypothesis and Significance Tests on the Mean. Inference on proportions: Estimating proportions, Confidence interval on  $p$ , Sample size for estimating  $p$ , Testing Hypothesis on a proportion, Comparing two Proportions-Estimation and Hypothesis Testing

### UNIT 6:

(8 Hrs)

Categorical Data: Multinomial Distribution, Chi-squared Goodness of Fit Tests, Testing for independence:  $r \times c$  Test for Independence, Comparing proportions:  $r \times c$  Test for homogeneity

Statistical Quality Control: Properties of control charts, Shewhart control charts: Sample Mean chart, R chart, P chart, C charts  
Acceptance Sampling, Two-Stage acceptance sampling

**Text Books:**

1. Trivedi K., "Probability and Statistics with reliability, Queuing, and Computer Science Applications", PHI, ISBN: 81-203-0508-6

2. Spiegel, Schiller, "Probability and Statistics" 2nd Edition, TMH, ISBN: 0-07-058610-1

**Reference Books:**

1. Papoulis, Pillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, TMH, ISBN: 0-07-048658-1

# 310906 Business Communications

**Teaching Scheme :**  
**Lectures :1 Hrs per week**

**Examination Scheme:**  
**Practical scheme: 1 Hrs /week**  
**Term Work: 50 marks**

## **Objectives :**

- To enable students to plan and draft communication documents such as letters, reports, presentations etc.
- To develop and nurture the soft skills of the students through individual and group activities.

## **Unit I**

**4 Hours**

- a. Introduction to business communication: Meaning, Importance & objectives
- b. Principles of Communication, forms of communication
- c. Need of communication for IT professional
- d. Barriers of effective communication, Techniques of effective communication.

## **Unit II**

**4 Hours**

- a. Self Development and Assessment: Self-Assessment, Self-Awareness,
- b. Perceptions and Attitudes,
- c. Values and Belief Systems, Personal Goal Setting,
- d. Career Planning, Self-Esteem, Building of Self Confidence

## **Unit III**

**4 Hours**

- a. Verbal and Nonverbal Spoken Communications - Includes planning, preparation
- b. Oral Presentation skills, Use of presentation graphics, Use of presentation aids
- c. Perfect interview, listening and observation skills, Body Language,
- d. study of Communication Barriers

## **Unit IV**

**4 Hours**

- a. Writing of Technical reports, Project Proposals, Brochures,
- b. Newsletters, Technical Articles, Technical Manuals,
- c. Official / Business Correspondence: Business Letters,
- d. Memos, Progress Reports, Minutes of Meeting, Event Reporting

## **Unit V**

**4 Hours**

- a. Ethics and Etiquette: Business Ethics,
- b. Etiquette in social as well as office settings,
- c. E-mail etiquette, Telephone Etiquette, Engineering ethics,
- d. Ethics as an IT Professional, Civic Sense

## **Unit VI**

**4 Hours**

- a. Reports: Types of Business Reports - Format,
- b. Choice of vocabulary, coherence and cohesion,
- c. paragraph writing, organization reports by individual,
- d. Report by committee.

## **Reference Books:**

1. Lesikar, R.V. & Flatley, M.E. (2005). Basic Business Communication Skills for Empowering the Internet Generation. Tata McGraw Hill Publishing Company Ltd. New Delhi.
2. Ludlow, R. & Panton, F. (1998). The Essence of Effective Communications. Prentice Hall of India Pvt. Ltd. Adair, J. (2003). Effective Communication. Pan Mcmillan.
3. Thill, J. V. & Bovee, G. L. (1993). Excellence in Business Communication. McGraw Hill, New York.
4. Bowman, J.P. & Branchaw, P.P. (1987). Business Communications: From Process to Product. Dryden Press, Chicago.

<http://www.toastmasters.org/MainMenuCategories/FreeResources/NeedHelpGivingaSpeech.aspx>

<http://marciaconner.com/resources/>

## **Business Communications Practical Assignments**

1. SWOT analysis of self.
2. Writing about self goals and plans
3. Analysis of a scenario
4. Presentation on any given topic
5. Preparation of interview questions
6. List a few non verbal communication aspects
7. Design and plan information brochure
8. Format a newsletter.
9. Write a business letter, memo or event report.
10. Write a formal email
11. List IT ethics.
12. Essay writing on current topic
13. Read and write in your own words about a company financial report.

## 310907: C & C++ LABORATORY

### Practical Scheme:

4 hours/Week

### Practical Examination Scheme:

Term Work: 50 Marks

Practical: 50 Marks

### Suggested list of assignments

#### Using C

2. Write a program to accept a number from user and display all the prime number up to that number.
3. Write a program which should implement your own function equivalent to the library function to perform various string operations such as copy, length, reversing, palindrome, and concatenation and to find occurrence of a sub-string. (*Your user define function must have same parameter & return type as library function but different in name*)
4. Write a program to implement various logical and bit wise operators
5. Write a program to perform various operations such as union and intersection on sets
6. Write a program to perform addition and multiplication operations on matrix.
7. Write a program to create a text file, read it and convert into uppercase and write the contents into another text file by using command line arguments.
- 8.

#### Using C++

9. Write a program to compute Inverse of a matrix.
10. Design a Class 'Complex' with data members for real and imaginary part. Provide default and parameterized constructors and member functions to get, set, display, add, subtract, multiply and divide two complex numbers
11. Assignment – 3: Design a class "Distance" with kilometers, meters, and centimeters as data items. Provide parameterized and copy constructor and overload '+', '-', '\*', '<<' and '>>' operators or Design a class "Time" with Hours, minutes and seconds as data members. Provide parameterized and copy constructor and overload '+', '-', '<<' and '>>' operators.
12. Write a class 'Point' with x and y coordinates as data members. Derive two classes 'Line' and 'Circle' from 'Point' with appropriate data members. Derive a class 'Triangle' from class 'Line'. Implement read () and draw () member functions for all the above classes.
13. Write a program to overload arithmetic operators (+, -, \*, /).
14. Write a 'C++' Program to maintain the employee details using files using OOP concept. Implement functions to add a new employee, delete a record of an employee, sort records, modify records, search an employee details and display the details of an employee.
- 15.

Proper indenting, coding styles, commenting, naming conventions should be followed. Avoid using global variables as far as possible Use of functions is necessary. Faculty should prepare a lab manual including standard test cases and should be available to students for reference. Use Open Source environments to the extent possible.

Student should submit term work in the form of a journal consisting of minimum 12 (Listed above) + 04 (to be added by faculty) = 16 assignments based on the above list. Practical examination will be based on the term work. And questions will be asked during the examination to judge the understanding of the practical performed at the time of examination. Candidate is expected to know the theory involved in the experiment.

## 310908: OPEN SOURCE TOOLS LABORATORY

### Practical Scheme:

4 hours/Week

### Practical Examination Scheme:

Term Work: 50 Marks

Practical: 50 Marks

### Assignment No 1:

**WINDOWS7/8/Linux derivative equivalent to Fedora18 or Android:** Installation, Desktop setting - new folder, rename, recycle bin operations, briefcase function, control panel utility, Network setting, Display properties : Screen saver, background settings, Using Command line utilities of Linux/DOS/Windows etc.

### Assignment No 2:

**Writer:** Create a document such as your resume or notes of any topic of your text book using facilities below  
Creating file: save, save as, save as HTML, save as Text, template, RTF format, Page setup utility: Margin settings, paper size setting, paper source, layout, Editing: cut, paste, paste special, undo, redo, find, replace, goto etc, View file: Page layout, Normal outline, Master document, ruler, header, footer, footnote, full screen, Insert: break, page number, symbol, date and time, auto text, caption file, object, hyperlink, picture etc. Format: font, paragraph, bullets and numbering, borders and shading, change case, columns, Tools: Spelling, merge documents, protect document, Mail merge, Macro. Table: Draw label, insert table, cell handling, table auto format, sort formula, Give password to document, Index, Table of Contents, Frame: Create, Modify, Link, Delete

### Assignment No. 3

**Impress :** Create any presentation using following facilities  
Creating new slide, formatting slide, slide layout, slide show and sorter, Inserting new slide, slide no., date, time, chart, formatting slide, tool operation, Animation, Timing, Inserting Video clips, Convert PowerPoint to Impress Presentation, Restart A Presentation Automatically

### Assignment No. 4

**Base :** Create a database for Inventory or reservation system or student information system (with multiple tables and relation) and generate different reports  
Parts of an Access Window, Tool Bars and Their Icons, Creating a New Database, Creating a New Table, Rename Columns, Saving the Database, Relationships, Creating Table, Relationship, Query, Forms, Reports, Import/export tables etc.

### Assignment No. 5

**Calc:** Create small accounting applications such as Maintaining invoices/budgets or totaling of various transactions or Maintaining daily and monthly sales reports or any other application using following facilities of excel  
Menus, Opening of Spread Sheet, creation of cells and addressing of cells, Cell inputting, Manipulation of cells, Enter texts numbers and dates, Creation of tables, Cell Height and Widths, Copying of cells, Providing Formulas, Using basic functions/formalism a cell such as Sum, average, Percentage and Other basic functions and draw graphs, import/export, Lookup



## **Assignment No. 6**

### **Internet:**

#### **A. Creation of Blog**

**B. Email Client for Open Source System:** Add your email (hotmail) account in 'outlook express' and explore the settings. Create your signature in 'outlook express' with following details: 1) Name, 2) Postal Address, 3) Phone, 4) PRN etc.

#### **C: Create a group on Yahoo groups for your class ( set properties)**

**D: HTML Editor (Open Source System) :** Introduction, Toolbars, Commands and Their Icons, Creating a Web Page

Student should submit term work in the form of a journal consisting of minimum 12 assignments based on the above list. Practical examination will be based on the term work. And questions will be asked during the examination to judge the understanding of the practical performed at the time of examination. Candidate is expected to know the theory involved in the experiment.

## 310909: Java Programming

**Teaching Scheme:**  
4 Lectures per week

**Examination Scheme:**  
Theory 70 Marks

### Prerequisites

- II. Object oriented programming concepts.
- III. Good programming practices.

### Objectives:

1. To cover most of the aspects of Core Java so as to understand Advanced Java later on.
2. To revise the pure OOP concepts
3. To understand the environment of Java.
4. To develop small applications using AWT, Swing.

### Unit 1: Introduction

**8 hours**

Features of Java, the Java Programming environment – (JDK, command line tools), Fundamental Programming structures in Java – (data types, variables, operators, strings, input and output control flow and arrays)

### Unit 2: Classes and interfaces

**8 hours**

Class, Object, Using predefined classes, Defining your own classes, constructors, static data member and methods, inner classes and anonymous classes, introduction to interface, its structure and implementation.

### Unit 3: Inheritance and polymorphism

**8 hours**

Inheriting variables and methods in class, inheritance and constructors, abstract class and final class, object wrapper and autoboxing, inheritance and interfaces, introduction to packages.

**Unit 4: Multithreading and exception handling 8 hours** introduction, life cycle of a thread, thread states, thread properties, methods in Threads and Runnable, setting priority of threads, synchronization and inter thread communication, introduction to exception handling, predefined and user defined exceptions.

### Unit 5: Applet and AWT

**8 hours**

Introduction to applet, life cycle of applet, development and execution of simple applet, drawing simple geometry shapes in applet, Introduction to AWT, events, listeners, event handling methods, a small application to demonstrate use of controls – label, button, check box, text, radio button, layout.

### Unit 6: Swing

**8 hours**

Introduction to swing, difference between swing and AWT, Japplet class, icons, small application using JLabelcontrol, JTextField, JButton, Jcheckbox, Jcombobox, Jradiobutton.

## 310910: DATA STRUCTURES USING C & C++

### Teaching Scheme:

Lectures: 4 Hrs / week

### Examination Scheme:

Theory: 70 Marks

### Objectives:

1. To study the representation, implementation of basic data structures
2. To develop the ability to synthesize and analyze algorithms
3. To study applications of Data Structure in solving real life problems

### Unit I

(8 Hrs)

#### Introduction to Data Structures and Array Concepts

Introduction to data structures: Concept of data, Data types, Data Object, Data structure, Abstract Data types (ADT), Linear data structures using sequential organization: Concept of sequential organization, Concept of Linear data structures, arrays as ADT, Multidimensional arrays, Storage representations (row major and column major and their address calculation). Polynomial representation using arrays, Application of array in sparse matrix representation, addition and transpose

### Unit II (8 Hrs) Linked Lists

Concept of linked organization, singly linked list, doubly linked list, circular linked list and operations on above data structure. Application of linked list for Representation and manipulations of polynomials

### Unit III

(8 Hrs)

#### Stacks and Queues

Concept of stack and queues as ADT, Implementation of stacks using sequential and linked organization, linear queue, circular queue using sequential and linked organization, Priority Queue, Application of stack for expression conversion, evaluation, processing of function calls, and recursion, Application of queue in job scheduling

### Unit IV (8 Hrs) Non linear data structures

Tree : Trees and binary trees-concept and terminology, Sequential & Linked representation of binary trees, Algorithm for tree traversals, Conversion of general tree to binary tree, Binary search trees, Applications of binary tree : expression tree, decision tree  
Graph: Representation of graph -Adjacency matrix and Adjacency list, Graph traversals, application of graph: connected components , Spanning tree, Minimum cost spanning tree, shortest path computation

### Unit V

(8 Hrs)

#### Searching and Sorting

Sequential, binary and Fibonacci search. General concepts: sort order, sort stability, efficiency and passes, Internal and external sorting, Bubble sort, Quick and Merge sort.

### Unit VI (8 Hrs) Files:

Organization of files: sequential and direct access file and simple index file, hashing function and its characteristics, collision resolution, linear probing, chaining with and without replacement, rehashing.

**Text Books:**

1. Horowitz E., Sahani S., "Fundamentals of Data structures", PHI
2. Aho A., Hopcroft J., Ulman J., "Data Structures and Algorithms", Pearson Education, 1998, ISBN-0-201-43578-0
3. Data Structures: A Pseudocode Approach With C [Richard F. Gilberg](#), [Behrouz A. Forouzan](#), Cengage Learning

**REFERENCES:**

1. Donald Knuth "Art of Programming" , Vol 1,2,3, Pearson Education
2. Varsha H. Patil, "Data Structures Using C++" 1<sup>st</sup> Edition, Oxford University Press, ISBN-13: 978-0-19-806623-1
3. Langsam Y., Augenstein M., Tannenbaum A., "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9
4. Horborn T., "File Concepts"
5. Brassard G., Bratley P., "Fundamental of Algorithms", PHI, 1999, ISBN 81 – 203 –1131–0
6. Trembley, J.P. and Sorenson P.G., An Introduction to Data Structures with Applications, McGrawHill International Student Edition, New York(1984)

## 510911: WEB TECHNOLOGY

### Teaching Scheme:

Lectures: 4 Hrs / week

### Examination Scheme:

Theory: 70 Marks

#### Unit-I: Introduction to Web Technologies

8 hours

Brief introduction to WWW, Components of Web Technologies (Web Server, Mail Server, Web Browser etc.), Static and Dynamic Websites, Concept of 2,3Tier Architecture, Role of Middleware, Application of Web Technologies in E-Commerce, Web Space registration. Management and uploading (utilities like FTP, TFTP), Client Browser Configuration.

#### Unit-II: HTML and CSS

8 hours

Common HTML Tags, Types of HTML tags, Text formatting tags, List tags, Image Mapping, Tables, Frames, Forms ,Concept of style sheet, Types of Style sheet, Inline Style Sheet, External Style sheet and examples on it, Embedded Style Sheet and Examples ,Text formatting properties, Border Properties in CSS and examples,<div> and <span> tag, use of it, Color property in CSS,Use of Classes in CSS, more Examples on CSS

#### Unit-III: DHTML and VBScript

8 hours

DHTML role and benefits, creating interactive web pages using DHTML, Introduction to Scripting, Server Side and Client Side Scripting, using VB Script in web pages, VBScript variables, statements, procedures, functions.

#### Unit-IV: JavaScript

8 hours

Concept of script, Types of Scripts, Introduction to javascript, Variables, identifiers and constants in javascript, Operators in javascripts, various types of javascript operators , Control and looping structure (if, if...else, for, while, do while, switch, etc....), Concept of array, how to use it in javascript , types of an array, examples on it. Event handling in javascript, Math and date object.

#### Unit-V: XML

8 hours

Concept of XML,features of XML, Writing XML elements, attributes ,XML with CSS,XML with DSO, XML Namespace, XML DTD, XML schemas, writing simple sheet using XSLT,SAX Parser, DOM Parser, Introduction to SOAP, Examples on XML.

#### Unit-VI: Introduction to PHP

8 hours

Introduction PHP and the Web Server Architecture Model, Overview of PHP Capabilities, CGI vs. Shared Object Model PHP HTML Embedding Tags and Syntax Simple PHP Script Example, PHP and HTTP Environment Variables , PHP Language Core Variables, Constants ,Data Types, Operators ,Decision Making , Flow Control and Loops ,Working with Arrays , Strings and functions Outputting Data, Include and Require Statements , Error Handling and Reporting Considerations , Processing HTML Form Input from the User , Creating a Dynamic HTML Form with PHP , Login and Authenticating Users, Using GET, POST, SESSION, and COOKIE variables, Session Management and Variables, Working with Cookies, Sending Email.

**Reference Books:**

2. Complete reference HTML, TMH, 4th Ed.
3. Web Technologies - 2nd Edition, Tata McHill by Achut Godbole
4. CSS - Definitive Guide. By Eric Meyer, Oreilly Publication
5. JavaScript Bible, Wiley Pub.
6. HTML, DHTML, JavaScript, Perl & CGI Ivan Bayross, BPB Pub, 3rd Ed.
7. Beginning XML Wrox Press
8. XML how to program Deitel & Deitel, Pearson Pub.
9. Beginning PHP5, Wiley Pub.
10. Complete Ref. PHP, TMH.
10. Beginning PHP, Apache, MySql web development, Wiley Pub.

**Reference Sites:**

1. [www.w3schools.com](http://www.w3schools.com)
2. [www.devguru.com](http://www.devguru.com)

## 310912: System Analysis and Design

**Teaching Scheme:**  
4 Lectures per week

**Examination Scheme:**  
Theory 70 Marks

### Objectives:

2. To facilitate students to develop skills that will enable them to construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain.
  3. To design the syllabus so as to follow system analysis and design and focus on the process aspect of system / software design.
  4. To be able to get clarity towards the information systems development.
  5. To acquaint them with documents related to requirement gathering, process based diagrams, input output documents.
- 

### Unit 1 8 Hours

Introduction to software engineering, the software as product and a process software process models – waterfall model, incremental development, reuse oriented software engineering, introduction to agile.  
Systems approach vs engineering approach,  
case studies to explain 1) the importance of information systems, 2) availability and reliability of information systems, 3) flexibility of information systems.

### Unit 2 8 Hours

- A. Software Development process : SDLC
- B. Requirements Engineering – characteristics of requirement, requirement elicitation and analysis, validation and verification
- C. Identification of attributes.
- D. Feasibility Analysis : technical and economic

### Unit 3 8 Hours

- 3.1 Data Flow Diagrams : Symbols, describing a good system with DFD
- 3.2 DFD : leveling of DFD, logical and physical DFD
- 3.3 Process Specification, Decision Tables.
- 3.4 Introduction to ER Diagrams and Data Dictionary.

### Unit 4 8 Hours

- 4.1 Data Input Methods : Data input, coding techniques.
- 4.2 Designing outputs : objectives of output design, design of output reports.
- 4.3 Software development – introduction to project and modules, coupling and cohesion
- 4.4 Case studies on DFD, ERD

### Unit 5. 8 Hours

- 5.1 Introduction and importance of software testing
- 5.2 Software Security concept and software maintenance
- 5.3 Control of information system
- 5.4 Audit of information system

**Unit 6****8 Hours**

- 6.1 Introduction to software development and deployment environment
- 6.2 Introduction to component based software engineering
- 6.3 Introduction to distributed software engineering
- 6.4 Introduction to service oriented architecture

**REFERENCES:**

1. Software Engineering - Ian Sommerville
2. Software Engineering - A practitioner's approach - Roger S.Pressman
3. Software Engineering – Pfleeger and Atlee
4. System Analysis and Design – Elias Awad



# 310913: Management Theory & Practices

## Teaching Scheme:

Lectures: 4 Hrs / week

## Examination Scheme:

Theory: 70 Marks

**Objectives:** The basic management concepts and use of management principles in the organization will be introduced to student through this elaborative subject.

### Unit 1

#### Introduction to Management

8 hours

Definition of Management: its nature and purpose, Management as a Science or an Art? The need, scope, purpose of Management, The Systems approach to Operational Management, Functions, skills of Managers, Functions and activities of Management, planning, organizing, staffing, directing and controlling

### Unit 2 8 hours Organization

Introduction -definition, Need for Organization, Process of Organizing, Organizational structure Functional organization, Product Organization, MOA and AOA, Organizational structures, Definition, types, merits and demerits of each of structures (Line, Functional, Line and staff, Committee, Matrix and Project structure)

### Unit 3

8 hours

#### Organizational Behavior

Definition / Concepts, Need, Group and Group Dynamics, Team Building, Leadership: - Definition - its importance to the organization - leadership style approaches to the study of leadership - trait, behavioral and situational approaches - Fiedler's contingency model - Hersey and Blanchard's Theory, Black and Moutan's Theory, Path and Goal Theory.

### Unit 4 8 hours Conflict Management & TQM

Conflict Management, Motivation: Concept Theory X, Y and Z, Total Quality Management - techniques of TQM, Re-engineering-empowerment

### Unit 5

8 hours

#### Management Information System

Definitions, Role of MIS, MIS in Academics, Structure of MIS based on management activity and functions, System and Information concepts to MIS, Applications of MIS, CRM: Customer relationship Management, Supply chain management

### Unit 6

8 hours

#### Managerial Decision Making

Introduction, Decision making environment: Open Systems, Closed system, Decision making under certainty, Decision making under uncertainty, Decision making under risk, Decision Types /models: Structured decisions, unstructured decisions, Programmable decisions, Non programmable Decisions Classical Model Administrative model, Decision making tools: Autocratic, Participative, and Consultative Decision Making Tools, Herbert Simpson's Model, Principle of Rationality / Bounded Rationality

#### Text Books:

1. Organizational Behavior: Stephen Robbins, Prentice Hall of India.
2. Principles and Practices of Management Shejwalkar

3. Management Information Systems, Jawadekar W.
4. Management Information System - Gordon Devis, Margrethe H. Oison

**Reference Books:**

1. Shukla M., "Business Organization and management ", ISBN 81-219-0813 2
2. Essential of management 7th edition Koontz H &Weitrich H TMH
3. Management Today Principles And Practices Burton & Thakur
4. Mgmt. Principles and Functions Ivancevich &Gibson, Donnelly
5. Organizational behavior Keith Davis
6. Organizational behavior Fred Luthans TMH 10<sup>th</sup> edition
7. Information Systems for Modern Management - Robert Murdick, Joel e. Ross, PHI, 3rd Ed.
8. Decision Support & Intelligent System - Efraim Turban, Pearson, 8th Ed.

## **310914: Web Technology Laboratory**

### **Teaching Scheme:**

Theory 1 Hrs/ week

Practical 1 Hrs/ week

### **Examination Scheme:**

Term work 50 marks

WT Lab should consist of following practical assignments. These are suggested assignments and should be expanded to make 12 sub assignments.

1. Design a static website using HTML elements to show the use of table, links, client side image maps and form elements.
2. Write external, internal and inline CSS to design the web pages.
3. Write VB script functions to check the load and unload of form page, null string validation and calculation of age of person.
4. Write Java Script functions to validate form controls using regular expressions.
5. Create XML file for a student or customer or employee. Next create the document type definition for the xml structure and finally create the schema document for the xml document.
6. Create the page visit counter using PHP.
7. Store the form data in any file or database.

## 310915: Java Programming

### Teaching Scheme:

4 Hours / week

### Examination Scheme:

Term work 50 marks

Practical 50 marks

**Assignment 1:** Getting acquainted with Java Environment. (Students will know use of java interpreter, compiler, class-paths etc.)

Formulate any 2 problem statements e.g. Managing student/collage/supermarket information to demonstrate use of

1. Java Classes.
2. Java Packages
3. Java Interfaces
4. Exception handling

**Assignment 2:** Implementation of multithreading.

1. Using matrix manipulation / sorting technique.
2. Creating digital clock.

To demonstrate concepts like

1. Thread creation
2. Thread communication.
3. Thread prioritization.

**Assignment 3:** AWT Implementation.

1. Creation of calculator.
2. Create GUS for information management & processing (e.g. personal data, admission- process etc.)

**Assignment 4:** Applet Handling

1. Implement any problem (e.g. font settings / text formatting ) using applets & HTML file for parameter passing.
2. Animation using images / sound / videos.

**Assignment 5:** File Handling.

1. Command based accepting file name, data from user, doing data updation, deletion, insertion into files.
2. AWT Based – From GUI, accepting data, displaying data, processing data.

**Assignment 6:** JDBC & Networking.

1. Create a database (e.g. collage / student / shop) Execute DDL/DML queries on it.

Students will submit the term work in the form of a journal, which will include at least 12 assignments based on the topics mentioned above. Practical examination will be based on the term work and questions will be asked to judge understanding of assignments performed at the time of examination

## 310916: DATA STRUCTURES LABORATORY

### Teaching Scheme:

Practical: 4 Hrs/Week

### Examination Scheme:

Term Work: 50 Marks

Practical: 50 Marks

### Suggested List of Assignments

1.
  - A) Implement application of array in sparse matrix to perform simple and fast transpose
  - B) Implement application of array in sparse matrix to perform matrix manipulation.
  - C) Implement application of array in polynomial expression.
  
2.
  - A) Write a menu driven program to perform following operations on singly linked list: Create, Insert, Delete, and Display
  - B) Write a menu driven program to perform following operations on singly linked list: Create, reverse, search, count and Display
  
3.
  - A) Create two doubly linked lists. Sort them after creation using pointer manipulation.  
Merge these two lists into one list so that the merged list is in sorted order. (No new node should be created.)
  - B) Write a menu driven program to perform operations on doubly linked list:
  
4.
  - A) Implement circular linked list and perform operations on it.
  - B) Represent polynomial as a circularly linked list and write a menu driven program to perform addition and evaluation.
  
5.
  - A) Implement stack as an ADT. Use this ADT to perform expression conversion and evaluation. (Infix – Postfix)
  - B) Implement stack as an ADT. Use this ADT to perform expression conversion and (Infix – Prefix)
  
6.
  - A) Implement circular queue using arrays
  - B) Implement job scheduling algorithm using queue
  
7.
  - A) Write a program to implement Merge sort method .
  - B) Write a program to implement Heap sort method.
  - C) Implement Fibonacci Search.
  
8.
  - A) Create binary tree and perform recursive traversals.
  - B) Create binary tree. Find height of the tree and print leaf nodes. Find mirror image, print original and mirror image using level-wise printing.

9.

A) Create binary search tree and perform recursive traversals.

B) Create binary search tree. Find height of the tree and print leaf nodes. Find mirror image, print original and mirror image using level-wise printing.

10.

A) Represent graph using adjacency list/adjacency matrix and perform Depth First Search.

B) Represent graph using adjacency list/adjacency matrix and perform Breadth First Search.

11.

A) Implement minimum cost spanning tree algorithm.

B) Implement shortest path algorithm.

12.

A) Write a program for file handling (Create, display, modify, delete records).

B) Write a program of file which reads and sort the records(Consider any suitable data).

**Students are expected to perform at least ONE assignment from each group. Each student should submit the term work in the form of journal consisting of minimum FIFTEEN Assignments.**

## 410901: Advanced Java

### Teaching Scheme:

4 Lectures per week

### Examination Scheme:

Theory 70 Marks

### Prerequisites:

1. Core java concepts.
2. Good programming practices.

### Objectives:

1. To revise the core concepts
2. To enable the students to create applications with database connectivity, jsp, servlet and implementing business logic with EJB.
3. JSP, Servlet, EJB, Spring, Hibernate introduced to enhance their technical skills.

### Unit I: 8 hours Introduction to J2EE: J2EE Overview, Why J2EE?, J2EE

Architecture, J2EE

Container.

**JDBC:** JDBC Introduction, JDBC Architecture, Types of JDBC Drivers, JDBC versus ODBC and other API's, The java.sql package, Connecting to databases, Manipulating records of a ResultSet object through User Interface, The JDBC Exception classes, Data Manipulation (using Prepared Statements, Joins, Transactions, Stored Procedures), Data navigation.

### Unit II:

**8 hours**

**Introduction to Servlets:** Servlet Vs CGI, Servlet API Overview, Servlet Life Cycle, Generic and HttpServlet, ServletConfig and ServletContext, request, response headers, get and post methods, Accessing HTML form data, Session Tracking & Management, Passing INIT and CONTEXT Parameter

### Unit III:

**8 hours**

**Introduction to JSP:** Jsp Architecture, MVC Architecture, JSP tags and expressions, JSP Lifecycle methods, Request, application, session and page scope, JSP Implicit Objects, Handling JSP errors, Exception Handling and Error Pages, Tag Libraries, Using custom tags.

### Unit IV:

**8 hours**

**Enterprise JAVA Beans: Enterprise Bean overview,** Types of Enterprise Java beans,

Advantages of enterprise beans, The Life Cycles of Enterprise Beans, Session Bean & Entity Bean, Stateful vs. Stateless Session Beans, Features of Session Bean, Life-cycle of Stateful Session Bean, Features of Entity Bean, Life-cycle of Entity Bean, Container-managed Transactions & Bean-managed Transactions, Implementing a container-managed Entity Bean, Message Driven Beans

### Unit V:

**8 hours**

**Spring:** Overview of spring, the core spring module, wiring beans, aspect-oriented

spring, database and managing transactions with swing, Building web applications with spring MVC, Working with remote services, Managing spring with JMX

**Unit VI:**

**8 hours**

**Hibernate:** Hibernate architecture and features, Hibernate elements, Object Relational persistence, Working with persistence object, The Hibernate Query Language (HQL) and externalizing queries, Writing Hibernate applications.

**References:**

1. Complete Reference- J2EE Jim Keogh, TMH
2. Murach's Java Servlets and JSP, [Joel Murach](#), [Andrea Steelman](#), Mike Mu-rach & Associates, 2008
3. Java Server Programming Vol-I Wrox press
4. Developing Java Servlets James Goodwill, Techmedia Pub
5. Struts complete reference, TMH.
6. Struts in Action, dreamTech pub.
7. Hibernate in action, Christian Bauer, Gavin King, Manning Publications
8. Spring in Action, Manning Publications.



## 410902: DBMS

**Teaching scheme:**  
**Lectures: 4 Hrs/Week**

**Examination Scheme:**  
**Theory: 70 Marks**

### **Objectives:**

1. To learn and understand Database System and its components
2. To learn SQL and Database Design and HBASE

### **Prerequisites:**

1. Discrete Structures
2. Data Structures and Files

### **Unit I (08 Hrs)**

**Introduction to DBMS:** Basic concepts, Advantages of a DBMS over file-processing systems, Data abstraction, Database Languages, Data Models and Data Independence, Components of a DBMS and overall structure of a DBMS, Multi-User DBMS Architecture, System Catalogs

### **Unit II (08 Hrs)**

**Data Modeling:** Basic Concepts, entity, attributes, relationships, constraints, keys, E-R and EER diagrams: Components of E-R Model, conventions, converting E-R diagram into tables, EER Model components, converting EER diagram into tables, Realization of ER Diagram in UML

### **Unit III (08 Hrs)**

**Relational Model:** Basic concepts, Attributes and Domains, Codd's Rules, Relational Integrity: Nulls, Entity, Referential Integrities, Enterprise Constraints, Views, Schema diagram

**SQL:** Characteristics and advantages, SQL Data Types and Literals, Nulls, DDL, DML

**SQL DDL Queries:** Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Indexes

### **Unit IV (08 Hrs)**

**SQL DML Queries:** SELECT Query and clauses, Set Operations, Predicates and Joins, Set membership, Tuple Variables, Set comparison, Ordering of Tuples, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update and Delete Queries, Updation using Views, concept of Triggers, Embedded SQL, Dynamic SQL, ODBC, SQL Functions: Character, Numeric, Date, Conversion etc.

**PL/SQL:** Introduction, PL/SQL Basics: Block, Data types, Variables, Expressions, Program flow, Using SQL with PL/SQL: Retrieving Data, Cursors, Built-in SQL functions, creating and using Procedures

### **Unit V (08 Hrs)**

Relational Database Design: Purpose of Normalization, Data Redundancy and Update Anomalies,

Concept of Functional Dependency, The Process of Normalization: 1NF, 2NF, 3NF and BCNF.

Methodology: Introduction to Database design methodology, overview of Database design methodology, Conceptual Database design

### **Unit VI (8 Hrs)**

#### **HBASE**

**NoSQL :** The Dawn of Big Data, The Problem with Relational Database Systems, Nonrelational Database Systems, Not-Only SQL or NoSQL?

**Building Blocks** : Tables, Rows, Columns, and Cells, Auto-Shading, Introduction to HBASE Architecture.

**Text Books:**

6. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", 4<sup>th</sup> Edition, McGraw Hill Publishers, 2002, ISBN 0-07-120413-X
7. Connally T., Begg C., "Database Systems", 3<sup>rd</sup> Edition, Pearson Education, 2002, ISBN 81-7808-861-4
8. HBase : The Definitive Guide by Lars George, O'Reilly Publication.

**Reference Books:**

1. Rab P. Coronel C. "Database Systems Design, Implementation and Management", 5<sup>th</sup> Edition, Thomson Course Technology, 2002, ISBN 981-243-135-7
2. Elmasri R., Navathe S., "Fundamentals of Database Systems", 4<sup>th</sup> Edition, Pearson Education, 2003, ISBN 8129702282
3. Date C., "An Introduction to Database Systems", 7<sup>th</sup> Edition, Pearson Education, 2002, ISBN 81 –7808 – 231- 4
4. Ramkrishna R., Gehrke J., "Database Management Systems", 3<sup>rd</sup> Edition, McGraw-Hill, 2003, ISBN 0 – 07 – 123151 – X
5. Hbase In Action by Nick Dimiduk, Amandeep Khurana, Manning Publication
6. Online Resource at <http://hbase.apache.org>, and at the Wikipedia URL <http://wiki.apache.org/hadoop/FrontPage>

# 410903: OPERATING SYSTEMS

**Teaching Scheme:**  
**Lectures: 4 Hrs/Week**

**Examination Scheme:**  
**Theory: 70 Marks**

## **Objectives:**

1. To understand the concepts and components of Systems Programming
2. To Learn and understand the fundamentals of Operating systems

## **Prerequisites:**

1. Data Structures

**Unit I (8 Hrs) Introduction to System Software** , Overview of all system software's:

Operating system

I/O manager, Assembler, Compiler, Linker ,Loader.

Introductory Concepts: Operating system functions and characteristics, historical evolution of operating systems, Real time systems, Distributed systems.

**Unit II (8 Hrs) Operating Systems:** Methodologies for implementation of O/S service system calls, system programs, Interrupt mechanisms.

**Process** - Concept of process and threads, Process states, Process management, Context switching

Interaction between processes and OS Multithreading Process Control, Job schedulers, Job Scheduling, scheduling criteria, scheduling algorithms

**Unit III (8 Hrs) Concurrency Control** : Concurrency and Race Conditions, Mutual exclusion requirements

Software and hardware solutions, Semaphores, Monitors, Classical IPC problems and solutions.

Deadlock : Characterization, Detection, Recovery, Avoidance and Prevention.

## **Unit IV**

**(8 Hrs)**

**Memory management:** Contiguous and non-contiguous, Swapping, Paging, Segmentation and demand Paging, Virtual Memory, Management of Virtual memory: allocation, fetch and replacement

## **Unit V**

**(8 Hrs)**

**File Management:** Concept, Access methods, Directory Structure, Protection, File System implementation, Directory Implementation, Allocation methods, Free Space management, efficiency and performance

**IO systems:** disk structure, disk scheduling, disk management.

## **Unit VI**

**(8 Hrs)**

Case Study of Linux: Structure of LINUX, design principles, kernel, process management and scheduling, file systems installing requirement, basic architecture of UNIX/Linux system, Kernel, Shell Commands for files and directories cd, cp, mv, rm, mkdir, more, less, creating and viewing files, using cat, file comparisons, View files, disk related commands, checking disk free spaces, Essential linux commands.

Understanding shells, Processes in linux – process fundamentals, connecting processes with pipes, Redirecting input output, manual help, Background processing, managing multiple processes, changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep, Printing commands, grep, fgrep, find, sort, cal, banner, touch, file, file related commands – ws,

sat, cut, grep, dd, etc. Mathematical commands – bc, expr, factor, units. Vi, joe, vim editor.

### **Textbooks**

1. Silberschatz, Galvin, Gagne, "Operating System Concepts", 6<sup>th</sup> Edition, John Wiley and Sons, ISBN 9812 – 53 – 055 – X
2. Dhamdhere D., "Systems Programming and Operating Systems", 2<sup>nd</sup> Edition, Tata McGraw Hill, 1999, ISBN 0 – 07 – 463579 – 4

### **Reference Books**

1. John J.Donovan,"systems programming" Tata McGraw Hill, ISBN-13: 978-0-07-460482-3.
2. Stallings W., "Operating Systems", 4<sup>th</sup> Edition, Prentice Hall, 81 – 7808 – 503 – 8
3. Beck L., "System Software: An Introduction to Systems Programming", 3<sup>rd</sup> Edition, Pear-son Education, 1997, ISBN 0-201-43581-0
4. Aho A., Sethi R., Ullman J., "Compilers", Pearson Education, 81 – 7808 – 046 – X

## 410904: OBJECT ORIENTED ANALYSIS & DESIGN

### Teaching Scheme:

Lectures: 4 Hrs/Week

### Examination Scheme:

Theory: 70 Marks

### Objectives:

After completing this course, students will be able to understand the issues involved in implementing an object-oriented design. Analyze requirements and produce an initial design. Learn to use the essential modeling elements in the most recent release of the Unified Modeling Language - UML 2.0

### UNIT I:

(8 Hrs)

An overview - Object basics. Benefits of OO Methodology. Two views of Software Development: SSAD, OOAD, Overview of Prominent OO Methodologies: The Rumbaugh OMT, The Booch methodology. Jacobson's OOSE methodologies, Rational Unified Process, 4+1 View architecture, Architectural approaches.

### UNIT II:

(8 Hrs)

Introduction to UML & History, UML 2.0 New Features, UML Meta-Model, Extensibility mechanisms like stereotypes, Tagged Values, constraints and profiles, OCL, Overview of all diagrams in UML 2.0

Use case diagram, Requirement Capture with Use case. Building blocks of Use Case diagram - actors, use case, guidelines for use case models. Relationships between use cases - extend, include, generalize.

### UNIT III:

(8 Hrs)

Class diagrams: Classes, values and attributes, operations and methods, responsibilities for classes, abstract classes, access specification (visibility of attributes and operations). Relationships among classes: Associations, Dependencies, Generalizations, Aggregation. Adornments on Association: association names, association classes, qualified association, n-ary associations, ternary and reflexive association. Dependency relationships among classes, notations. Object diagrams notations and modeling, relations among objects (links).

### UNIT IV:

(8 Hrs)

Interaction diagrams: Sequence diagrams, Interaction occurrences, and combines fragments.

Communication diagrams, Interaction Overview diagrams including interactions, signals, exceptions, regions, partitions.

### UNIT V:

(8 Hrs)

Activity diagrams: Activities, sub activities, signals, pins, exceptions, partitions, fork, join, regions, State Machine diagrams: States, encapsulation of states, transitions, submachine, state generalization, Timing diagrams.

### UNIT VI:

(8 Hrs)

Modeling Architecture in UML: Package diagrams, Component diagrams, Deployment diagrams. Applications of UML in embedded systems, Web applications, commercial applications, Introduction to Design Pattern: Modeling Design Pattern & Architectural Pattern

**Text Books:**

1. Grady Booch, James Rumbaugh, Ivar Jacobson "Unified Modeling Language User Guide", The (2nd Edition) (Addison-Wesley Object Technology Series) (Hardcover)
2. Hans-Erik Eriksson, Magnus Penker, Brion Lyons, David Fado "UML 2 TOOLKIT" OMG Press.

**Reference Books:**

1. Joseph Schmuller, "SAMS Teach yourself UML in 24 Hours", Third edition.
2. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third Edition (Paperback) , Addison Wesley
3. Dan Pilone, Neil Pitman, "UML 2.0 in a Nutshell", (In a Nutshell (O'Reilly)) Paperback)
4. Jim Arlow, Ila Neustadt, "UML 2 and the Unified Process : Practical Object-Oriented Analysis and Design" (2nd Edition) (Addison-Wesley Object Technology Series)
5. Michael Jesse, James A. Schardt, "UML 2.0 for dummies"
6. Kendal Scott, Apress, "Fast track UML 2.0"

## 410905: OPERATIONS RESEARCH

### Teaching Scheme:

Lectures: 4 Hrs/Week

### Examination Scheme:

Theory: 70 Marks

### Unit I

(8 Hrs)

**Introduction to Linear Programming** – Various definitions, Statements of basic theorems and properties, Advantages Limitations and Application areas of Linear Programming, Linear Programming -Graphical method, - graphical solution methods of Linear Programming problems, The Simplex Method: -the Simplex Algorithm, Phase II in simplex method, Primal and Dual Simplex Method, Big-M Method

### Unit II

(8 Hrs)

**Transportation Model and its variants:** Definition of the Transportation Model -Nontraditional Transportation Models-the Transportation Algorithm-the Assignment Model– The Transshipment Model

### Unit III

(8 Hrs)

**Network Models:** Basic differences between CPM and PERT, Arrow Networks, Time estimates, earliest completion time, Latest allowable occurrences time, Forward Pass Computation, Backward Pass Computation, Representation in tabular form, Critical Path, Probability of meeting the scheduled date of completion, Various floats for activities, Critical Path updating projects, Operation time cost trade off Curve project, Selection of schedule based on :- Cost analysis, Crashing the network Sequential model & related problems, processing n jobs through – 1 machine & 2 machines

**Unit IV (8 Hrs) Network Models: Scope of Network Applications** – Network definitions, Goal

Programming Algorithms, Minimum Spanning Tree Algorithm, Shortest Route Problem, Maximal flow model, Minimum cost capacitated flow problem

**Unit V (8 Hrs) Decision Analysis:** Decision - Making under certainty - Decision - Making under Risk, Decision under uncertainty.

**Unit VI (8 Hrs) Simulation Modeling:** Monte Carlo Simulation, Generation of Random Numbers, Method for Gathering Statistical observations

### Reference Books:

1. Taha H., "Operations Research: An Introduction", 7th Edition, 2004, ISBN 81-203 – 2235- 5
2. Winston W., "Operations Research", 3rd Ed.; Windows Lindo Logo, 1997
3. Hillier F., Lieberman G., "Introduction to Operations Research", 7th Edition, Tata McGraw-Hill, 2001, ISBN 0-07-047387-0

## 410906: HBASE LABORATORY

**Teaching Scheme:**  
**Practical:** 4 Hrs/Week

**Examination Scheme:**  
**Term Work:** 50 Marks  
**Practical:** 50 Marks

### **Objectives:**

- To learn and understand Front End Programming
- To learn and understand SQL, PL/SQL
- To learn any Relational Database such as Oracle/MySQL/HBase/SQL Server etc.
- To learn and understand Database Project Life Cycle.

### **Part I: Front End Programming**

Write and execute 4 assignments in any Front End tool to illustrate its various features.

Write a program to illustrate database connectivity.

### **Part II: RDBMS - SQL, PL/SQL**

Introduction to SQL, Introduction to DDL, DML, DCL, TCL, Data types, Integrity constraints, SQL Operators, SQL SET Operators, SQL Functions -Character, Date, Null Values, Aggregate, Group By, Having Clause, Order By, Joins, Subquery, Multi table Inert & Merge, Case Expression.

**DDL Statement :** Create, Alter, Drop – Table, View, Index, sequence, and synonyms, User, Role

**DML Statement:** Insert, Select, update, Delete – Table, View

**DCL Statement :** Grant, Revoke

**TCL Statement :** Commit, Rollback, Save Point

Introduction to PLSQL, PL/SQL Block, Data types, Control structure, Loops, Operators

**Cursors :** Implicit, Explicit, REF., Collection and Record

**Sub Program :** Stored Functions & Stored Procedures, Package **Database Triggers :** Row level & Statement level.

**Exception Handling :** Built in Exception & User defined Exception  
(Instructor will define problem definition for each batch of reasonable complexity such that

it facilitates the use of all ER/EER features such as all types of relationships including aggregation, generalization, all types of attributes, strong and weak entities. Mapping of ER diagram to schema design should be implemented at least up to 3NF)

#### **1 ER/EER Assignment**

Design and draw an ER/EER diagram using standard notations for service industry (like Hospital, Airline, hotel, insurance, health case etc) and map this diagram into Database Tables.

#### **2 DDL/DML Assignment**

a) Create Database Tables in RDBMS generated in problem 1. (Instructor



should see that student's uses row level and table level integrity constraints, while creating tables)

- b) Use DML statements such as INSERT, UPDATE, DELETE to insert the data into tables and to update/delete the data inserted into/from tables if required.
- c) Write and execute SQL queries to extract information from the tables.  
(Instructor should frame problem definition such that it will involve use of text manipulation functions, aggregate functions, group value functions, Date functions, conversion and transformation functions, simple queries and nested queries, renaming of attributes, removal of duplications, creating views etc.)

### **PL/SQL assignments**

- a. Simple PL/SQL programs using the tables created.
- b. Write and execute Triggers. (Instructor will frame appropriate problem definition, so that students study different data types & variables, program control statements)

### **Part III: HBase**

1. Introduction to HBase Command Shell (Preferably JRuby-based (JIRB) shell)
2. Study of HBase Commands – create, get, put, list, scan, delete, alter, count, describe.

### **Reference Books:**

1. "Visual Basic 6 Programming", Black Book DreamTech Press
2. SQL and PL/SQL for Oracle 10g Black Book, Dr. P.S.Deshpande DreamTech Press
3. Visual Basic 6 Programming – Tata McgrawHill ,Content Development Group.
4. Urman S., Hardman R., McLAUGHLIN M., "PL/SQL Programming: Develop Database Driven PL/SQL Applications", Tata McGraw-Hill Edition, 2004, ISBN 0 -07 - 059779 - 0
5. Sunderraman R, "Oracle 9i programming - a Primer", Pearson Education, ISBN 81 -297-0362-9
6. Rosenzweig B., Silvestrova E., "Oracle PL/SQL by Example", 3rd Edition, Pearson Education ISBN 81-297-0503-6
7. Online Resources <http://hbase.apache.org> and <http://wiki.apache.org/hadoop/Hbase/Shell>

## 410907: Advance Java Lab

### Teaching Scheme:

Practical: 4 Hrs/Week

### Examination Scheme:

Practical: 50 Marks

Term Work: 50 Marks

### **Assignment 1: Getting acquainted with J2EE Environment & JDBC.**

(Students will know installation of Web Server & Different J2EE Components etc.)

Formulate any 2 problem statements e.g. Managing student/collage/supermarket implement JDBC Concept

### **Assignment 2: Implementation of Servlet.**

Creation of Calculator

Creation of Shopping Cart Application

### **Assignment 3: JSP**

Create GUI for information management & processing (e.g. personal data, admission- process etc.)

Create an Application to implement custom tags in JSP

### **Assignment 4: EJB**

Write a program to create Stateful/ Stateless Session bean

### **Assignment 5: EJB**

Building of two Web Applications with Spring MVC

### **Assignment 6: Hibernate**

Write Hibernate application to run HQL

Note: Use of Application development Tools such as Eclipse, KAWA, J Creator/VJ + +, Coffee cup etc. is recommended.

Students will submit the term work in the form of a journal, which will include at least 12 assignments based on the topics mentioned above. Practical examination will be based on the term work and questions will be asked to judge understanding of assignments performed at the time of examination.

## 410908: UML Lab – Umbrello

### Teaching Scheme:

Theory: 1 Hrs/Week

Practical: 1 Hrs/Week

### Examination Scheme:

Term Work: 50 Marks

### List of Practical Assignments

Application must be considered from any 2 of the following domains:

1. Financial(banking) Management System (e-banking)
2. Hospital Management System
3. Hotel Management System
4. Library Management System
5. Event Management System (arranging seminar /workshop /conference sports/ cultural / annual social gathering etc)
6. Payroll Management System
7. Inventory Management System
8. Telecommunication Management System (Cellular Phone)
9. Order processing Management System
10. College Admission Process
11. Online Transaction Management System (e-shopping)
12. Online Reservation System (railway, airlines, e-booking etc.)
13. Placement Agency Management System
14. Online Insurance Management System
15. College Training and Placement Management System
16. Car Rental System
17. ATM System
18. Share Trading System (BSE/NSE/Nifty)
19. Student Information System
20. Feedback Management System
21. Retail Management System

The UML 2.0 diagrams need to be drawn with the help of Umbrello UML open source tool for practical purpose for any 2 of the above case studies. All diagrams are to be assumed for UML 2.0. For each diagram the need, purpose, Concepts, Notation need to be explained.

## 410909: ADVANCED WEB TECHNOLOGY

### Teaching Scheme:

Lectures: 4 Hrs/Week

### Examination Scheme:

Paper: 70 Marks

### Objectives :

1. To learn .Net 3.5
2. To get acquainted with SilverLight, WPF, WCF and LINQ

### Prerequisites:

1. Object Oriented Programming Concepts

### Unit-I : The .NET Framework

(8 Hrs)

The .net framework, Common Language Runtime, C# VB and the .Net language ,Types Objects and Namespaces, the .Net class library, advantages of managed code, the C# language, The relationship of c# to .net

### Unit-II : C# Programming Language

(8 Hrs)

Introduction to C# 2008,Flow control and Exception handling, Namespaces, Classes, objects, Structs, Object oriented programming in c#2008, Pointers, Delegates, Events

### Unit-III :Windows Forms and Windows Presentation Foundation (WPF) (8 Hrs)

Windows Forms in C# 2008, Introduction to Windows Presentation Foundation, Working with WPF3.5 Control (Container,Simple, Content, Items controls)

### Unit-IV : ASP.NET 3.5 and SilverLight

(8 Hrs)

Introduction to ASP.Net 3.5 and web forms, Web server controls, Navigation Controls, Login and Web Parts control, enhancing web application with silverlight

### Unit-V : Services and Deployment

(8 Hrs)

ASP.Net 3.5 Web services, Introducing Windows Communication Foundation, Deploying Web Application

### Unit-VI : ADO.NET and LINQ

(8 Hrs)

Introduction to ADO.Net, Accessing data, Using XML in web Application, working with LINQ

### References:

1. C# 2008 Programming: Covers .Net 3.5 Black Book, Platinum Ed By **Kogent Solutions Inc**
2. MasteringASP.NET with Visual C# By **A. Russell Jones**
3. Beginning ASP.NET 3.5 in C# 2008: From Novice to Professional By **Matthew MacDonald**

## 410910: Banking and Financial Accounting & Management

### Teaching Scheme:

Lecture: 4 Hrs/Week

### Examination Scheme:

Theory: 70 marks

**Objective:** To impart basic Banking and Financial Accounting knowledge that is required for a career as Software Developer.

**Unit I: Introduction (10 Hrs) Financial Accounting-**Definition, Scope and objectives, System of Book Keeping,

Terms used in accounting, Accounting Concepts, Principle and Conventions, 3 rules for book keeping

**Recording of transactions:** Maintenance of journals, Subsidiary Books, Ledger, Cash Book and Trial Balance

**Preparation of Final Accounts:** Preparation of trading And Profit & Loss Accounts And Balance Sheet

**Unit II: Tools of financial Management (8 Hrs)**

**Elements of Costs:** Material, Labour, overhead, Preparation of cost sheet

**Ratio Analysis:** Classification of Ratio, Structural group, Turnover group, Limitation of Ratio Analysis, Return on Investment.

**Marginal costing:** - Cost –Volume-Profile Analysis: Mechanics of break-even Chart. Practical application of marginal costing, Margin of Safety.

**Management of cash:** motives of holding cash preparation of cash budget.

**Unit III: Working Capital Management (6 Hrs)**

Concepts & needs, Factors affecting working capital requirement, Estimation of working capital requirement, Financing the working capital requirement

**Unit IV: Introduction to Banking (6 Hrs)**

Regulatory authorities for banking in India – Reserve Bank of India, Ministry of Finance, Co-Op Registrar, DICGC, NABARD, NHB, Types of Banks, Laws governing banks - Banking Regulation Act, Negotiable Instruments Act, etc.

Types of Accounts – Deposit, Loans, Other accounts, Control accounts, Linked Accounts, PPF , Pension & other Govt Scheme accounts.

**Unit V: Types of Transactions in Bank (5 Hrs)**

Cash, Clearing and Transfer type of transactions in bank branch environment, Cheques, Dividend Warrants, Demand Drafts, Local Pay Order, Payable at Par Instruments, OBC / IBC transactions, Offline transactions & Online transactions, Standing Instructions, Straight Through Processing, Online transfers across the banks – NEFT, RTGS, SWIFT. Electronic Clearing Service – Debit (for utility bill payments) & Credit (for dividend / interest transfer)

**Unit VI: Types of IT Systems used by the banks (5 Hrs)**

ALPM (Automated Ledger Posting Machine), PBA (Partial Branch Automation), TBA (Total Branch Automation), CBS (Core Banking System)

Service Delivery Channels used by Banks – ATM, NET Banking, POS, Mobile banking

Examination will have at least 1 problem on either of the following

1. Journal Entries / Cash Book / Trial Balance preparation,
2. Bank Reconciliation, Cost Sheet preparation, Ratio Analysis
3. Marginal Costing, Estimation of working Capital Requirements

Text Books for Section I Accounting:

1. Financial Management :By S.M. Inamdar , Everest Publication
2. Cost & Management Account : By S.M. Inamdar , Everest Publication
3. Book Keeping & Accounting Textbook of Standard XI : Balbharati

## 410911: Computer Network & Information Security

### Teaching Scheme:

Lectures: 4 Hrs/Week

### Examination Scheme:

Theory: 70 Marks

### Objectives:

1. To learn and understand fundamentals of computer network
- 2.
3. To learn and understand network architectures, protocols and applications
- 4.
5. To learn different aspects of Information Security over Network

### Unit I

(08 Hrs)

Networking Fundamentals : What is Computer communication? Transmission Modes, Synchronous and asynchronous transmission, Transmission Media: Guided Media – Twisted Pair, Coaxial and Fiber-optic cables, Unguided Media: Radio, VHF, Micro Waves and Satellite, Multiplexing: FDM, TDM, CDM and WDM  
Switching Techniques: Circuit switching, Packet switching and message switching, Network topologies, LAN, MAN, WAN , Types of Networks: Peer to Peer, Client-Server  
Network Hardware Components: Connectors, Transceivers and Media Converters, Repeaters, NICs, Bridges and Switches ,Router, Gateway

### Unit II

(08 Hrs)

Protocols and Standards, OSI Model, TCP/IP Model, Data Link Layer: Services, Framing, Error and flow control, Stop -and-Wait protocol, Sliding Window protocol, Go-Back-N ARQ, Selective Repeat ARQ. Medium Access Control sub-layer: Multiple Access Protocols: ALOHA, CSMA, Collision-free and limited-contention protocols, WDM Ethernet: Cabling, encoding, Switched, fast and Gigabit Ethernet, Virtual LANs, Bluetooth, Virtual Circuit Switching: Frame Relay and ATM

### Unit III

(08 Hrs)

Network Layer: Connectionless and Connection -oriented Services ,Routing Algorithms, Internetworking, Congestion prevention policies, Load sharing, Jitter Control, Network layer Protocols: ARP, IP protocol, IP Addresses, IPV6, ICMP, Unicast  
Routing Algorithms: RIP, OSPF, BGP, Multicast Routing: IGMP, Mobile IP  
Transport Layer: Sockets, Elements of Transport protocol: Addressing, Connection establishment and release, flow control and buffering, Multiplexing, Simple Transport Protocol- TCP & UDP

### Unit IV

(08 Hrs)

Application Layer: Domain Name System (DNS) and DNS servers, Electronic Mail: Architecture and services, Message Formats, MIME, message transfer, SMTP, Mail Gateways, Relays ,File Transfer Protocol, General Model, commands, TFTP  
World Wide Web: Introduction, Architectural overview, static and dynamic web pages, WWW pages and Browsing, HTTP

## Unit V

(08 Hrs)

Introduction to Information security: Different Types of attack, Principles of Data Security Architecture, Different types of Cipher, Security policies, Authentication protocol based on symmetric and asymmetric cryptosystem, Overview of private-key and public-key cryptographic algorithms: DES, RSA. Diffie-Hellman based Key Agreement protocol

## Unit VI

(08 Hrs)

Secure Socket Layer (SSL), Secure network infrastructure services: DNS, NTP, SNMP, Privacy enhanced mail (PEM), Secure SNMP, ARP Hazards, One-time passwords: schemes based on S/KEY, PKI components and Applications, Secure binding of public and private values: DNS certificates. Firewall, User authentication: Biometric devices.

### Reference Books:

1. Tanenbaum A., "Computer Networks", 4th Edition, PHI, ISBN 81 – 203 – 2175 – 8
2. Fourauzan B., "Data Communications and Networking", 3rd edition, Tata McGraw-Hill Publications, 2004, ISBN 0 – 07 – 058408 – 7
3. Comer D., "Computer Networks and Internet", 2ND Edition, Pearson Education, ISBN 81 – 7808 – 086 – 9
4. Stallings, W., "Cryptography and Network Security: Theory and Practice", Second Edition, John Wiley
5. Schneier, B., "Applied Cryptography - Protocols, Algorithms, and Source Code in C", Second Edition. John Wiley and Sons, 1995



## 410912: Information Systems Audit (Elective – I)

### Teaching Scheme:

4 lectures / week

### Examination Scheme:

Theory 70 Marks

#### Unit I :

8 Hrs

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

#### Unit II :

8Hrs

IT environment – hardware, system software, OS, DBMS, Infrastructure, network concepts, Personnel, documentation, review of performance, procurement, and other controls, Network concepts, LAN, WAN, Client- Server architecture, Internet, EDI, email, encryption, digital signatures – review of performance, procurement and other controls.

**Unit III :** 8Hrs Software procurement and development –SDLC – Meaning and IS auditor's role in traditional SSAD , OOM , prototyping , 4GL , project management , testing , implementation review. Is-operations -planning, organizing, scheduling, SCM, problem management, record management, QA and QC , review and controls

#### Unit IV:

8 Hrs

Controls – Input , process , validation , output, logical access, physical access , database , network , environment , BCP , Evidence collection, evaluation and reporting methodologies

#### Unit V :

8 Hrs

IS strategies and management – organization structure , IT Plans - long term and short term plans , steering and other committees , HR policies , segregation of duties , IT crimes , viruses , security , privacy issues

#### Unit VI :

8 Hrs

Broad introduction to COBIT 5 framework from ISACA

### References :

1. "EDP Auditing Conceptual Foundations And Practices" by Ron Weber – McGraw-Hill publication
2. CISA Review Manual from ISACA ([www.isaca.org](http://www.isaca.org))
3. COBIT 5 Framework from ISACA
4. IS Audit Standards from ISACA

## 410912 : Cyber Laws (Elective I)

### Teaching Scheme:

Theory :4 Hrs/ Week

#### Unit 1 Introduction

Introduction to Cyberspace and its Architecture, Evolution and Basic Concepts of Internet, Cyberspace, Internet Ownership and Management, Data Security and Management, Data Encryption and Digital Signature, Convergence. Internet Telephony and VPN, Social Issues in the Regulation of Cyberspace, The Regulability of Cyberspace, UNCITRAL Model Law on Electronics Commerce 1996

#### Unit 2 Regulation of Cyberspace

E-governance, Issues Concerning Democracy, National Sovereignty, Personal Freedom, Emerging Social Issues from Cyberspace, Digital Divide, Promotion of Global Commons, Open Source Movement, Laws and Entities Governing Cyberspace, Domestic Laws: Background of IT ACT – Part I, IT Act – Part II, International Treaties, Conventions and Protocols Concerning Cyberspace, Guidelines Issued by Various Ministries

#### Unit 3 Cyber Crimes and Torts

Introduction to Cyber Wrongs, Conventional Crimes and Torts Through Computers, Crimes and Torts Committed on a Computer Network and Relating to Electronic Mail, Crimes Relating to Data Alteration/Destruction, Issues of Jurisdiction and Applicable Law in Cyberspace, Enforcement Issues in Cyberspace, Online Dispute Resolution, cyber stalking; cyber pornography; forgery and fraud; crime related to IPRs; Cyber terrorism; computer vandalism

#### Unit 4 Commerce and Cyberspace

E-Commerce : E-commerce: Evolution. Meaning and Type, Payment Mechanism in Cyberspace, Advertising and Taxation vis-a-vis E-commerce, Consumer Protection in Cyberspace, Online Contracts, Forms of Online Contracts, Features of Online Contracts, Issues Emerging from Online Contracting,

#### Unit 5 Intellectual Property Protection in Cyberspace

Intellectual Property in Cyberspace, Linking, In lining and Framing, P2P Networking, Webtesting, Domain Names, Management of IPRs in cyberspace, Liabilities of Internet Services Providers, Digital Rights Management, Search Engines and their Abuse, Non-original Database

#### Unit 6 Privacy and Data Protection

Right to Privacy and its Legal Framework, The Concept of Privacy, National Legal Framework for Protecting Privacy, International Legal Framework for Protecting Privacy, Privacy Related Wrongs and Remedies, Data Security, The Concept of Security in Cyberspace, Technological Vulnerabilities, Legal Response to Technological Vulnerabilities, Security Audit (VA/PT), Data Protection, Data Protection Position in India, Privacy Policy, Emerging Issues in Data Protection and Privacy, BPOs and Legal Regime in India, Protect Kids' Privacy Online, Evolving Trends in Data Protection and Information Security

### No recommended Text Book

### References –

1. IT Act 2000 as amended in 2008 downloadable from Ministry of IT, Govt of India

2. Internet based resources for the Cyber Law, Data & Privacy protection
3. Ignou's PG Diploma in Cyber Laws material

## 410912: IT Governance (Elective I)

### Teaching Scheme:

4 lectures / week

### Examination Scheme:

70 Marks External

#### **Unit I : Executive Summary**

**8 hours**

Executive's View of IT, Definition and Purpose of IT Governance, IT Governance Assessment Maturity Model, Integrated IT Governance Framework and Roadmap, Key Governance Roles, Responsibilities and Accountability, IT Governance Decision Rights, Demand Management, Balanced Score Card for Business and IT, Prerequisites for Creating a Successful IT Governance Program, Future State of IT Governance – A Blueprint Concept

#### **Unit II : Foundations of IT Governance**

**8 hours**

Why Do Organizations Need an IT/Business Governance Policy and Process, Value propositions from Best-in-Class Companies on Governance, Key IT Resources and Functions to be Managed, Three Critical Pillars of IT Governance – Organization/People, Process and Technology, Results of Ineffective IT Governance, Steps in Making IT Governance Real, A Generic Governance Process Improvement Model, A First Step – Understand Current Maturity of IT Governance

#### **Unit III : Integrated IT Governance Framework and Roadmap**

**8 hours**

Benefits of Using an Integrated IT Governance Framework, Integrated IT Governance Framework and Roadmap, Select Examples of Current and Emerging Business/IT Strategy and Governance Best Practice Reference Models, Frameworks and Standards

#### **Unit IV : Business/IT Alignment Excellence**

**8 hours**

The Board's Role in Driving Business/ IT Alignment, Principles of Aligning IT to the Business More Effectively, Business and IT Plan Integration Flow, Business and IT Strategy Development Framework and Outline, IT/Business Alignment & Portfolio Management Triangle, The Five Stages of IT , Investment (Portfolio) Management Maturity, IT Engagement (Relationship) Model

#### **Unit V : Program/Project Management (PM) Excellence**

**8 hours**

Value Propositions of PM from Leading Organizations, Principle for Achieving Excellence in Program/Project Management, PM Maturity Model, Linking IT/Business Plans to PM and Beyond PM Life Cycle Phases, Components and Key Templates, IT Demand Management Gate Process Flow and Select Decision Criteria, Fast Track versus Complex PM Initiatives (Scalable and Flexible Process)

PM Governance and Escalation Framework, PM Key Metrics – Mandatory and Discretionary The Roles of the Program Management Office (PMO)

#### **Unit VI Outsourcing and Vendor Management Excellence**

**8 hours**

The IT Balancing Dilemma, The Outsourcing Decision-Making Scorecard, Major Outsourcing Trends, Issues and Challenges, Differences Between Domestic and Off Shore Deals, Empowering Executives to Outsource, Vendor Selection Process Flow, Key Vendor Evaluation Criteria, Key Governance Roles, Processes and KPIs, Summary Steps in Vendor/Outsourcing Selection, Contract Negotiations and Management

## Performance Management, Management Controls and Risk Management

1. Principles for Achieving Performance Management Excellence
2. What Key Performance Indicators Should Be Tracked?
3. Linking Critical Success Factors to Key Performance Indicators
4. Governance Calendar and Balanced Scorecard
5. Select Examples of KPIs in Support of IT Governance Components
6. Key IT Management Controls
7. Risk Assessment, Management and Mitigation

### **Reference Material:-**

- IV. COBIT 5 IT Governance Framework from ISACA
- V. Implementing IT Governance by Dr Gad J Selig PMP COP
- VI. COSO Framework for Corporate Governance

## 410912: IT SERVICE MANAGEMENT (Elective I)

### Teaching Scheme:

4 hours / week

### Examination Scheme:

Theory 70 marks

#### UNIT I:

8 Hrs

**Overview** - what is service management? Introduction, Best practice' versus 'good practice' **Service management:** Meaning, Vision and mission strategy, Service leadership, Service mapping, Flowcharting, Benchmarking, Internal marketing, Productivity, Current status and future prospects

**UNIT II: 8 Hrs The service lifecycle , service strategy :** Introduction ,Governance ,Risk ,Key processes ,IT service provider types ,The four Ps of strategy, Service management as a strategic asset ,De-veloping strategy for specific services ,Service assets ,Value, Automating service manage-ment processes

**Service design:** Introduction, Why service design? , The five major aspects of service design, The service design package

#### UNIT III:

8 Hrs

**Service transition:** Introduction, Purpose and objectives, Process objectives and value Challenges, Roles

**Service operation:** Introduction, Purpose and objectives, the value of service operation, Key activities and functions, Self help

**Continual service improvement:** Introduction, Purpose and objectives, Key principles

#### UNIT IV:

8 Hrs

**It service continuity management:** Introduction and scope, Purpose and objectives, Key activities, Relationships with other service management processes ,Metrics, Roles

#### UNIT V: 8 Hrs Information security management and access management :

Introduction and scope ,Purpose and objectives ,The information security policy ,The information security manage-ment system ,Access management ,Facilities management – the control of physical access ,Relationships with other service management processes ,Metrics, Roles

#### UNIT VI:

8 Hrs

**IT operations management:** Introduction and scope, Purpose and objectives, Key activities, Relationships with other service management functions

**Technical management:** Introduction and scope, Purpose and objectives, Key activities Relationships with other service management functions

### Reference Books :

1. Foundations of IT Service Management Based on ITIL V3: an introduction, Volume 3 Jan Van Bon, Arjen de Jong, Axel Kolthof
2. IT Service management - Earnest Brewster, Richard Griffiths
3. Service Management 5E - Fitzsimmons
4. Metrics for IT service management - Peter Brooks

## 410913: Advanced DBMS

### Teaching scheme:

Lectures: 4 Hrs/Week

### Examination Scheme:

Theory: 70 Marks

### Objectives:

1. To learn and understand various Database system Architectures, OO Database Systems, XML Databases, NoSQL

### Prerequisites:

1. Database Management Systems

### Unit I:

(08 Hrs)

#### Query Processing

Introduction to Query processing, measures of query cost, selection operation, sorting, joined operations, other operations, evaluation of expression

**Unit II: (08 Hrs) Database System Architecture:** Introduction, centralized and client server

architecture: centralized systems, Client –server systems, server system architecture, Transaction server process structure, Transaction system processes, Data servers

**Parallel systems:** speed up and scaleup, Interconnection Networks, Parallel database architecture

**Unit III: (08 Hrs) Distributed systems:** Introduction. Design issues, Distributed DBMS Architecture.

Distributed Database Design, Database Integration, Data and Access Control. Introduction to Query Processing Problem.

### Unit IV: (08 Hrs) Object Based Database:

Need of OODBMS, storing of objects in relational database, introduction to OO data model

**Structure types and inheritance in SQL:** Structure types, Type inheritance, Table inheritance, Array and multiset types in SQL: creating and accessing collection values, Querying collection, nesting and unnesting, Object identity and reference types in SQL, implementing object relational features.

**Persistent programming languages:** Persistent of objects, object identity and pointers, storage and access of persistent objects, persistent systems: C++, JAVA, object management group, object database standard ODMG

### Unit V:

(08 Hrs)

#### XML Databases

Relational Database Tables and XML, Generating XML pages using Basic SQL, Oracle Database and XML, Native XML Database.

### Unit VI: (08 Hrs) NoSQL

Introduction to Data Models - Graph Databases, Schema-less Databases. Introduction to Distribution Models – single server, sharding, master-slave replication, peer to peer replication.

**Text Books:**

4. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database system concepts", 5<sup>th</sup> Edition , McGraw Hill International Edition
5. Jiawei Han, Micheline Kamber, "Data Mining : Concepts and systems" , Morgan Kaufmann publishers
6. Principles of Distributed Database by M Tamer Ozsü, Patrick Valduriez, Third Edition.
7. Beginning XML Databases by Gavin Powell, Wiley Publishing Inc.
8. NoSQL Distilled by Pramod Sadalage, Martin Fowler.

**Reference Books**

1. Rob Coronel, Database systems : "Design implementation and management", 4<sup>th</sup> Edition, Thomson Learning Press
2. Elmasri R., Navathe S., "Fundamentals of Database Systems", 4<sup>th</sup> Edition, Pearson Education, 2003, ISBN 8129702282
3. Richard J. Roiger, Michael W. Geatz, "Data Mining", LPE, Pearson Education, 2003, ISBN 8129710897



## 410914: WEB TECHNOLOGY Laboratory

### Teaching Scheme

Practical: 4 Hrs/week

### Examination Scheme:

Term work: 50 marks

Practical: 50 marks

### Suggested Assignments

1. Study of .NET environment. Explain the .net architecture.
2. Create classes and objects using C#.Net and understand OOP concepts
3. Understand the use of namespaces and public and private keys in .net with the help of a program.
4. Study and implement exception handling.
5. Create login form with Asp.net and database connectivity.
6. Use various other controls to create user input forms and understand the passing of values between asp.net forms.
7. Create a asp.net application to store and retrieve values in database.
8. Study web services. What is the difference between web service and SOA?
9. Create a web service in .net.
10. Create a small application to read from (& to) xml file and store values in database. Use xmlreader and xmlwriter class.
11. Study silverlight.
12. Study LINQ.

## 410915: ADVANCE DBMS LABORATORY

### Teaching Scheme

Practical: 4 Hrs/week

### Examination Scheme:

Term work: 50 marks

Practical: 50 marks

Following is the list of suggested assignments organized in categories I, II, III. Category I contains 12 assignments which are at an average level. Category II contains 5 assignments which can be performed by an above average student. Category III contains 3 assignments that require a good reading and implementation knowledge.

A student has to complete all the assignments mentioned in category I to get minimum term work marks.

A student can complete 2 out of 4 assignments to get additional term work marks of 3 per assignment.

A student can complete 1 out of 3 assignments to get additional term work marks of 4.

### Suggested list of Assignments

1. Solve complex SQL queries. Total 3 assignments on aggregate queries, joins. (to be decided by faculty at the start of semester)
2. Set up the Distributed Database environment. Total 3 assignments on installing the database instance and creating the distributed database environment.
3. Write simple object oriented queries. Total 3 assignments on types, inheritance and querying collection.
4. Design database using XML & evaluate queries. Total 3 assignments on creating xml, dtd and xsd and querying using FLWOR queries.

## **410916: Network & Security Lab**

**Teaching Scheme:**

**Theory: 1 Hrs/Week**

**Practical: 1 Hrs/Week**

**Examination Scheme:**

**Term Work: 50 Marks**

### **COMPUTER COMMUNICATION & NETWORK**

1. Study of different Networking Operations in the Windows / Linux
2. Study of Campus LAN design & testing of LAN using Ping Command.
3. Study of network devices: hubs, switches, modems, & routers.
4. Installation and configuration of web server & client.
5. PC to PC Communication using null modem.
6. Implementation of echo server using 'C' / C++ / Java language.

### **INFORMATION SECURITY**

1. Study & Implementation of Symmetric Key Cryptography Algorithms.
2. Study & Implementation of Asymmetric Key Cryptography Algorithms.

This is a suggested list of experiments and Colleges are free to add more experiments.

Students will submit the term work in the form of a journal, which will include at least 8 assignments based on the topics mentioned above with problem statement, implementation and results.

# 510901: Recent Technologies in IT

## Teaching scheme:

Lectures: 4 Hrs/Week

## Examination Scheme:

Theory: 70 Marks

**Prerequisites** : Assuming that students has good programming background and has knowledge of programming fundamentals, variables, decision making statements, loops, array, function etc using C/C++ and OOP concept.

## Objectives:

1. To study the recent technologies demanded and adapted by industry
2. Understanding the concept of complete software development and development stack.

## UNIT-1

(08 Hrs)

**Introduction to LAMP Technology** : Understanding cloud computing, Characteristics and Advantage of LAMP, Installation and Configuration of LAMP stack. Understanding Apache Web Server, PHP Concepts and various configuration files. Comparison of static and dynamic content, alternatives (Perl, CGI, ASP, JSP, Servlets, CGI, etc), PHP tools and set up (web browser/server, editor, libraries, etc) to run the program.

## UNIT-2

(08 Hrs)

**MySQL** : What is RDBMS technology? Introduction to MySQL, Connecting, selecting and querying MYSQL database, Displaying returned data on Web pages. understanding phpmyadmin to manage MySQL database. User Inputs using Forms, GET/POST methods, performing CRUD(Create, Retrieve, Update, Delete) operation of table using form.

**UNIT-3 (08 Hrs) PHP Programming fundamentals and Library function:** Create a basic PHP

Script, PHP variables and operators, Taking user inputs and generating outputs, Formatting String, library function for string manipulation. Array fundamentals, Single-Dimensional Arrays, Multidimensional Arrays, Associative arrays, library functions for array manipulation, Dates and Times function

**UNIT-4 (08 Hrs) OOP and Functions** : What a function, Creating a function, Returning value from

function, User-defined functions, Variable scope, Accessing variable with the global statement, Passing arguments to a function by value and by reference. Object oriented programming using PHP, Define a class, Object properties & methods, Object constructors and destructor, Class constants, Static method, Class inheritance, Abstract classes, Final keyword, Implementing Interface.

**UNIT-5 (08 Hrs) File Handling** : Creating and deleting a file, Reading and writing text files, Working

with directories in PHP, Checking for existence of file, Determining file size, Opening, reading, writing, appending a file, deleting a file. Working with file system to list file, change directory etc.

## **UNIT-6**

**(08 Hrs)**

Super global variables, Super global array, Combine HTML and PHP code, Using hidden fields, Redirecting the user, File upload(image, video, doc etc.), Need of Cookie & Session : cookie Handling, creating, accessing, deleting a cookie, Working with the query string, session handling, Starting a session, Registering, creating, deleting Session variables, encoding and decoding session variables

### **Text Books:**

1. PHP MYSQL Bible by Steve Suehring, Tim Coverse, and Joyce Park.
2. Beginning PHP, Apache, MySQL Web Development
3. Head First PHP & MySQL ISBN-10: **0596006306** | ISBN-13: **978-0596006303**

## 510902: Software Testing and Quality Assurance

### Teaching scheme:

Lectures: 4 Hrs/Week

### Examination Scheme:

Theory: 70 Marks

### UNIT I: Software Quality Assurance Fundamentals

(8 hrs)

Definition of Quality, QA, QC, SQA, SQA Planning & Standards, SQA Activities, Building blocks of SQA, Quality factor, Software Quality metrics, Process improvement- Process and Product quality-CMM ,Six Sigma

### UNIT II: Software Testing Fundamentals (8 Hrs) Software Testing

**Fundamentals** – Software Development Models, Verification & Validation

Concepts, Definition & Objectives of testing, testing life cycle

**Test Plan** - Preparation, Management and execution, **Test Cases** – Definition, Test Case Designing, Case Studies on Test Plan & Test Case

### UNIT III: Software Testing Methods (8 Hrs) White-Box testing methodologies:

Static testing: by humans, using static analysis tools, Structural Testing: unit/code functional testing, Code coverage Testing, Code Complexity testing, Mutation Testing

**Black-Box testing methodologies:** Requirement based testing, Positive and negative testing, Boundary Value analysis, Equivalence Partitioning, State based Or Graph-based Testing, Compatibility Testing, User Documentation Testing, Domain Testing

### UNIT IV: Software Testing Types

(8 Hrs)

Integration testing, System and Acceptance testing, Scenario testing, Performance Testing, Regression testing, Ad hoc Testing, Usability and Accessibility Testing, GUI testing, Validation testing, Specification-based testing,

### UNIT V:

(8 Hrs)

**Defect Management** - Defects, Defect life cycle, Origins of Defects, Defect Classes, Defect repository and Test Design, Developer/Tester support for Defect Repository

### Testing specialized Systems and Applications

Testing Object Oriented Software, Testing Web Based Applications, Database Testing

## **UNIT VI: Introduction to Automation Testing**

**(8 Hrs)**

What is automation testing, Difference between manual testing and automated testing, different automation testing tools, Software Test Automation through Selenium open source tool: Introduction to scripting language, Selenium IDE, Case studies of automation testing.

### **Reference Books:**

1. Software Engineering R. Pressmen – TMH, 7th Ed.
3. Introducing Software Testing Louise Tamres
4. Effective Methods for software Testing William Perry, Wiley Pub,3rd Ed.
5. Software Testing in Real World Edward Kit, Pearson Pub.
6. Software Testing Techniques Boris Beizer, dreamTech pub,2nd Ed.
7. Software Testing By Ron Patton, TechMedia Pub.
8. Selenium 1.0 Testing Tool beginners guide by David Burns, ISBN: 1849510261, ISBN 13: 9781849510264
9. Burnstein, "Practical Software Testing", Springer International Edition, ISBN 81-8128-089-X

## 510903: Software Engineering

### Teaching Scheme

Theory: 4 Hrs/Week

### Examination Scheme:

Theory: 70 Marks

Unit 1 Introduction to Software Development – 6 Hrs

Alternate System Development Models – Agile, Spiral, Extreme Programming, Clean room software engineering, Human rated software / Critical software, Architectural Design Decisions, System Organization, and Decomposition Styles. Personal & Team Process Model, CMMI

Unit 2 Preliminary Planning of an IT Project – 10 Hrs

Gathering Project Information from stakeholders, Defining process goals, establishing project priorities, Requirement Analysis, Risk Management – Identification, Classification, & Mitigation, Budgeting for a project, Creating a work breakdown structure, Gantt Chart, network diagram creation & analysis, tools for managing Project like MS Project or Openoffice Project.

Unit 3 Software Project Management – 10 Hrs

Verification & Validation, Critical System validation, Managing people, Software Cost Estimation, Quality Management, Process Improvement, Configuration Management, Preparing & Implementing project plan – Defining project schedule, project constraints, tracking project progress and financial obligations. Revising the Project Plan – need for revision, establishing the change control, implementing the project changes, coping with project delays, planning for versions & releases.

Unit 4 Dependability & Security – 8 Hrs Dependability properties, Availability, Reliability, Safety, Security, Safety Specification, Hazard identification, assessment, analysis and risk reduction, Security specification

Unit 5 Different architectures – 8 Hrs Distributed system issues, Client Server computing, Architectural patterns for distributed systems, Software As A Service (SAAS), SOA - Services as reusable components, Service engineering, Software development with services.

Unit 6 Product Metrics – 6 Hrs Software Quality, Framework for Product Metrics, Metrics for Analysis model, Design model, Metrics for Source code, Metrics for Testing & Maintenance

### Reference Book:-

1. Software Engineering – R. Pressman



## 510904: Data Warehousing, Data Mining & Business Intelligence

### Teaching Scheme:

4 lectures / week

### Examination Scheme:

Theory 70 marks

#### Objectives:

1. To learn and understand Data Mining and Warehousing
2. To learn and understand Business Intelligence

#### Prerequisites:

1. Database Management Systems
2. Web Technology

#### Unit I:

(08 Hrs)

#### Data Warehousing

Introduction to Data warehousing, architecture, Dimensional data modeling- star, snowflake schemas, fact constellation, OLAP and data cubes, Operations on cubes, Data preprocessing – need for preprocessing, data cleaning, data integration and transformation, data reduction

#### Unit II: (08 Hrs) Data Mining Introduction

What is data mining, why data mining, kinds of data and patterns that can be mined, technologies used for mining, kinds of applications targeted for mining, major issues in mining. Getting to know data – data objects and attribute types, basic statistical description of data, data visualization, measuring data similarity and dissimilarity.

#### Unit III: (08 Hrs) Data Mining

Descriptive and predictive data mining, outlier analysis, clustering – k means algorithm, classification – decision tree, association rules – apriori algorithm, Introduction to text mining, Bayesian classifiers.

#### Unit IV:

(08 Hrs)

#### BI Fundamentals

BI Components and Technologies – extraction, transformation and loading, Warehouse components, Analytical user requirements – (reporting and querying, OLAP, statistics, data mining), Dimensional technology and BI,

#### Unit V:

(08 Hrs)

#### Business Intelligence Architecture

Designing data architecture – Choosing the right architecture (atomic layer alternatives – ROLAP, HOLAP, data marts), modeling the architecture, operational data store, data architecture strategy.

#### Unit VI:

(08 Hrs)

**Introduction to BIRT** BIRT – Business intelligence reporting tool.

**References :**

1. IBM Data Warehousing: with IBM Business Intelligence Tools By Michael L. Gonzales – Wiley publication.
2. Data Mining: Concepts and Techniques: Concepts and Techniques By Jiawei Han, Micheline Kamber, Jian Pei

## 510905: Animation & Gaming (Elective – II)

### Teaching Scheme:

4 lectures / week

### Examination Scheme:

Theory 70 marks

#### Unit I : Introduction to Computer Graphics

8 Hrs

Definition Application, Pixel and Frame Buffer, Raster and Random Scan display  
Display devices- CRT, Color CRT Monitors Scan

Conversion of line- DDA algorithm of line drawing, Scan conversion of circle-  
Bresenham's circle generating algorithm, Polygon Filling- Scan line polygon filling  
algorithm.

#### Unit II : Animation Basics

8 Hrs

History of Animation, Terms used in Animation, Uses of animation, types of  
animation. Principles of animation, techniques of animation: Onion skinning, motion  
cycling, masking, flip book animation, rotoscoping and blue screening, color  
cycling, morphing, animation on the web, 3D animation, creating animation.

#### Unit III : Animation Development

8 Hrs

Animator's Drawing Tools, Rapid Sketching & Drawing, Developing Animation Character,  
Anatomy & Body Language, 2 D virtual drawing for animation, sequential movement  
drawing, Thumbnails, motion studies, drawing for motion, Essentials & qualities of good  
animation characters, Three dimensional drawings of characters.

#### Unit IV : Gaming Basics

8 Hrs

What is game development? Game design, Game programming : languages and  
architecture, game programming : graphics, animation, AI, audio and networking,  
game production and the business of games.

#### Unit V : Practical Java Game Programming

8 Hrs

Java as a game platform – The Java platform and its legacy, current java game  
development, types of games – sports games, puzzle games, racing games,  
Fundamentals of game programming, role playing games, strategy games,  
adventure – action games.

#### Unit VI : Fundamentals of Java Game Programming

8 Hrs

Basic game structure, obtaining input, applying game logic and updating system,  
rendering, blocking v/s non blocking loops, role of timing, core architecture using  
state controls, construction of basic entities, collision detection, actor management.

### Reference Books

1. Introduction to Game Development: Second Edition edited by Steve Rabin
2. Practical Java game programming by Dustin. Clingman, Shawn.  
Kendall, Syrus. Mesdaghi
3. The Complete Animation course by Chris Patmore, By – Barons  
Educational Series
- 4.
5. Anatomy of the Artist – Thompson & Thompson
- 6.
7. Computer Animation : Algorithms and Techniques by Rick Parent

## 510905: MOBILE COMPUTING (Elective – II)

### Teaching Scheme:

4 lectures / week

### Examination Scheme:

Theory 70 marks

#### UNIT-I

(8 Hrs)

Introduction, issues in mobile computing, overview of wireless telephony: Cellular networks, Cellular concept, Mobile Phone Technologies (1G, 2G, 2.5G, 3G)

GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS. Protocols

Localization and calling, Handover, Value Added Services

- SMS

- Cell Broadcast Service

- MMS

- Location Services

#### UNIT - II

(8 Hrs)

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth,

Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

UNIT-III (8 Hrs) Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

#### UNIT -IV

(8 Hrs)

Operating Systems for application development

Palm OS, Windows CE, Embedded Linux, J2ME (Introduction), Symbian (Introduction)

Android application development: Overview of Android, Devices running android, Why Develop for Android, Features of android, Architecture of Android, Libraries, Software development kit

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

UNIT- V (8 Hrs) Starting with Application Coding: Introducing Intents, Introducing Adapters, Using Internet Resources, Introducing Dialogs, Capturing Date and Time, Validating and Handling Input data

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

Data Storage, retrieval and Sharing: File system in android, Internal and external storage, Saving and loading files, File Management tools

#### UNIT -VI

(8 Hrs)

Introduction to SQLite: Creating SQLite database, Editing Tasks with SQLite, Cursors and

content values, Working with Android database.

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

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

### **References:**

1. Mobile Communications J. Schiller, Addison Wesley Publication
2. GSM System Engineering A. Mehrotra, Addison Wesley Publication
3. Understanding WAP M. Heijden, M. Taylor, Artech House Publication
4. Professional Android Application Development Wrox Publications, Reto Meier
5. Upadhyaya, Mobile Computing, Springer
6. Sams teach yourself Android application development, Lauren Dercy and Shande Conder, Sams publishing
7. Mobile Computing: Asoke K Talukdar, Roopa R. Yavagal, TataMcGrawHill
8. Principles of Mobile Computing , Hansmann, Merk, Nicklous, Stober, Springer, second edition

## 510905: High Performance Computer Networks (Elective – II)

### Teaching Scheme:

4 hours / week

### Examination Scheme:

Theory 70 marks

### UNIT I INTRODUCTION

8 hours

Review of OSI, TCP/IP; Multiplexing, Modes of Communication, Switching, Routing. SONET – DWDM – DSL – ISDN – BISDN, ATM.

### UNIT II MULTIMEDIA NETWORKING APPLICATIONS

8 hours

Streaming stored Audio and Video – Best effort service – protocols for real time interactive applications – Beyond best effort – scheduling and policing mechanism – integrated services – RSVP- differentiated services.

### UNIT III ADVANCED NETWORKS CONCEPTS

8 hours

VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN. MPLS operation, Routing, Tunneling and use of FEC, Traffic Engineering, MPLS based VPN, overlay networks-P2P connections.

### UNIT IV TRAFFIC MODELLING

8 hours

Little's theorem, Need for modeling, Poisson modeling and its failure, Non-poisson models, Network performance evaluation.

### UNIT V NETWORK SECURITY AND MANAGEMENT

8 hours

Principles of cryptography – Authentication – integrity – key distribution and certification  
– Access control and: fire walls – attacks and counter measures – security in many layers.

### UNIT VI

8 hours

Infrastructure for network management – The internet standard management framework – SMI, MIB, SNMP, Security and administration – ASN.1

### REFERENCES

1. J.F. Kurose & K.W. Ross, "Computer Networking- A top down approach featuring the internet", Pearson, 2nd edition, 2003.
2. Walrand .J. Varatya, High performance communication network, Morgan Kaufman  
– Harcourt Asia Pvt. Ltd. 2nd Edition, 2000.
3. LEOM-GarCIA, WIDJAJA, "Communication networks", TMH seventh reprint 2002.
4. Aunurag kumar, D. MAnjunath, Joy kuri, "Communication Networking", Morgan Kaufmann Publishers, 1ed 2004.
5. Hersent Gurle & petit, "IP Telephony, packet Pored Multimedia communication Systems", Pearson education 2003.
6. Fred Halsall and Lingana Gouda Kulkarni, Computer Networking and the Internet, fifth edition, pearson education
7. Nader F.Mir ,Computer and Communication Networks, first edition.
8. Larry I.Peterson&Bruce S.David, "Computer Networks: A System Approach"-1996

## 510906: Recent Technologies in IT - LAB

### Teaching Scheme

Practical: 4 Hrs/week

### Examination Scheme:

Term work: 50 marks

Practical: 50 marks

1. Installation & Configuration of LAMP server. Write down the steps and sequence for installing and configuring server. Briefly explain various configuration files.
2. Write short notes on MySQL? Compare it with other RDBMS and explain its advantage and Limitations.
3. Explain the GET/POST methods. Write a program to implement CRUD operation using form.
4. Write a program to read the table or query from user and display the output in HTML table.
5. Create a persistent login script using cookie/session and demonstrated using a small application containing 5 php pages.
6. Write a object oriented program to make an utility to export the response of query to excel, csv and word format.
7. Write a program to implement a hit counter using File handling.
8. Write a program to demonstrate operation on file system to create, list, delete file, change directory, file exists?, rename etc. using form as interface.
9. Write a program to implement distance calculator using google api.
10. Write a AJAX based form to update the database table contents.

## 510907: STQA LAB

### Teaching Scheme

Practical: 4 Hrs/week

### Examination Scheme:

Term work: 50 marks

Practical: 50 marks

- (1) Template designing (using Excel format)  
for Test plan  
Test case  
Defect Repository
- (2) Implementation of case studies for Test plan
- (3) Implementation of case studies for Test cases which are specified in test plan
- (4) Implementation of case studies for Defect Repository based on defects which are raised after execution of test cases
- (5) Manual Implementation of black box testing methods for various applications
- (6) Manual Implementation of white box testing methods for various coding patterns of particular application
- (7) Manual Implementation different types of testing (GUI Testing, UNIT testing, etc.) for particular application
- (8) General introductory study of Open source automated tool Selenium – Selenium IDE, Selenium Web driver, Selenium RC, etc.,
- (9) Implementation through selenium for testing web applications based on UI and flow
- (10) Implementation through selenium for testing web applications based on their coding parts.



## **510908: Mini Project**

### **Teaching Scheme**

Theory: 1 Hrs/week  
Practical: 1 Hrs/week

### **Examination Scheme:**

Term work: 50 marks

Mini Project is to be carried out in a group of 4 students. The Institute / College will display suggested list of Mini Projects(using Multi -core, 64 bit Architecture, OS and tools) and students can form group and take up the topic for their Mini Project on first come first served basis. Each group will be assigned a guide. At the end of the term the students should submit 2 copies of the report in a prescribed format provided by the institute duly signed by the guide and Head of the Department. Staff members of the institute will assess the mini project internally.

## 510909: PROJECT WORK

### Teaching Scheme

Practical: 6 Hrs/week/Project

### Examination Scheme:

Term work: 150 marks

Project Exam : 200 marks

The Students will undertake one project in a group over the semester, which will involve the design of a system or sub system in the area of applications in Computer Science/Engineering/IT.

The aim of project is to allow the student to study the feasibility of implementing project and planning project, studying existing system, tools available and state of art, software testing procedures and technology with use of case tools.

The project must involve the detail Software design Specification, Data Structure Layout, File Design, Testing with complete documentation and user interface with life cycle testing and as an executable package

The students will select a project and submit the name of the project with a synopsis of not more than 2 to 3 pages in the first week of January in the academic year.

**Students will submit Project Report before the end of Semester II. Project Examination will be conducted by Industry Examiners assisted by Internal Faculty.**

(A)The workable project (using atleast Multicore, 64 bit architecture)

(B)Project report in the form of bound journal complete in all respect - 1 copy for the Institute and 1 copy for the student

(C)The term work will be assessed by the examiners in consultation with the guide. Oral examination will be based on the project work completed by the candidates.

### **The project report should contain**

1. Problem definition and requirement specification, acceptance tests procedure (ATP).
2. System definition-Constraints and requirement Analysis
3. System design.
4. System implementation - code documentation – dataflow or UML diagrams , Details of Algorithm(using Divide and Conquer), protocols used.
5. Test result and procedure - test report as per User Acceptance Test Procedure.
6. Platform choice (atleast Multi-core-64 Bit)
7. Conclusion.
8. Appendix tools used, References.

Documentation will use UML approach with presentation, Category, Use Case, and Class Diagrams etc.

## **510910: SEMINAR - II**

### **Teaching Scheme**

Practical: 4 Hrs/Week

### **Examination Scheme:**

Term Work: 50 Marks

Each student will make a presentation on any topic in the area of his Major Project area preferably keeping track with recent technological trends and development. The topic must be selected in consultation with the institute guide. Each student will make a seminar presentation in the term making use of audio/visual aids for duration of 30 – 35 minutes and submit two copies of the seminar report in a prescribed format duly signed by the guide and Head of the department. Attendance for all seminars by all students is compulsory. A panel of staff members of the institute will assess the seminar internally.