# Proposed Syllabus and Scheme of Examination
## for
## B.Sc. Program with Computer Science

Submitted
to
## *Dibrugarh University*

Under
## Choice Based Credit System

# CHOICE BASED CREDIT SYSTEM

# B.Sc. Program with Computer Science

# Course Structure (Computer Science-Major)

**Details of courses under B.Sc. Program with Computers**

| Course | *Credits | |
|---|---|---|
| | Theory+ Practical | Theory + Tutorial |

========================================================

**I. Core Course**

| | | |
|---|---|---|
| **(12 Papers)** | 12X4= 48 | 12X5=60 |

04 Courses from each of the
03 disciplines of choice

**Core Course Practical / Tutorial***

| | | |
|---|---|---|
| **(12 Practical/ Tutorials*)** | 12X2=24 | 12X1=12 |

04 Courses from each of the
03 disciplines of choice

**II. Elective Course**

| | | |
|---|---|---|
| **(6 Papers)** | 6X4=24 | 6X5=30 |

Two papers from each discipline of choice
including paper of interdisciplinary nature

| | | |
|---|---|---|
| **Elective Course Practical / Tutorials*** | 6 X 2=12 | 6X1=6 |
| **(6 Practicals / Tutorials*)** | | |

Two papers from each discipline of choice
including paper of interdisciplinary nature

- **Optional Dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 6th Semester**

**III. Ability Enhancement Courses**

1. **Ability Enhancement Compulsory Courses (AECC)**

| | | |
|---|---|---|
| **(2 Papers of 2 credit each)** | 2 X 2=4 | 2 X 2=4 |

   Environmental Science
   English/MIL Communication

2. **Skill Enhancement Courses (SEC)**

| | | |
|---|---|---|
| (Minimum 2) | 4 X 2=8 | 4 X 2=8 |
| **(4 Papers of 2 credit each)** | | |

| | | |
|---|---|---|
| **Total credit** | **120** | **120** |

**Institute should evolve a system/policy about ECA/ General Interest/Hobby/Sports/NCC/NSS/related courses on its own.**

**\* wherever there is a practical there will be no tutorial and vice-versa**

# PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN

## B. Sc. Program (Computer Science)

| SEMESTER | CORE COURSE (12) | Ability Enhancement Compulsory Course (AECC) (2) | Skill Enhancement Course (SEC) (4) | Elective: Discipline Specific DSE (6) |
|---|---|---|---|---|
| I | Problem Solving using Computer (4 + 4)<br><br>DSC – 2A<br><br>DSC – 3A | (English/MIL Communication)/Environmental Science | | |
| II | Database Management Systems (4 + 4)<br>DSC – 2B<br><br>DSC – 3B | Environmental Science/ (English/MIL Communication) | | |
| III | Operating Systems (4 + 4)<br><br>DSC – 2C<br><br>DSC – 3C | | SEC – 1 | |
| IV | Computer System Architecture (4 + 4)<br><br>DSC – 2D<br><br>DSC – 3D | | SEC – 2 | |
| V | | | SEC – 3 | DSE – 1A<br>DSE – 2A<br>DSE – 3A |
| VI | | | SEC – 4 | DSE – 1B<br>DSE – 2B<br>DSE – 3B |

| SEMESTER | COURSE OPTED | COURSE NAME | Credits |
|---|---|---|---|
| I | Ability Enhancement Compulsory Course-I | English/MIL communications/ Environmental Science | 2 |
| | Core course-I | Problem Solving using Computer | 4 |
| | Core Course-I Practical/Tutorial | Software Lab using Python | 2 |
| | Core course-II | DSC 2A | 6 |
| | Core Course-III | DSC 3A | 6 |
| II | Ability Enhancement Compulsory Course-II | English/MIL communications/ Environmental Science | 2 |
| | Core course-IV | Database Management Systems | 4 |
| | Core Course-IV Practical/Tutorial | Database Management Systems Lab | 2 |
| | Core course-V | DSC 2B | 6 |
| | Core Course-VI | DSC 3B | 6 |
| III | Core course-VII | Operating Systems | 4 |
| | Core Course-VII Practical/Tutorial | Operating Systems Lab | 2 |
| | Core course-VIII | DSC 2C | 6 |
| | Core Course-IX | DSC 3C | 6 |
| | Skill Enhancement Course -1 | SEC-1 | 2 |
| IV | Core course-X | Computer System Architecture | 4 |
| | Course-X Practical/Tutorial | Computer System Architecture Lab | 2 |
| | Core course-XI | DSC 2D | 6 |
| | Course-XII | DSC 3D | 6 |
| | Skill Enhancement Course -2 | SEC -2 | 2 |
| V | Skill Enhancement Course -3 | SEC -3 | 2 |
| | Discipline Specific Elective -1 | DSE-1A | 6 |
| | Discipline Specific Elective -2 | DSE-2A | 6 |
| | Discipline Specific Elective -3 | DSE-3A | 6 |
| VI | Skill Enhancement Course -4 | SEC -4 | 2 |
| | Discipline Specific Elective -4 | DSE-1B | 6 |
| | Discipline Specific Elective -5 | DSE-2B | 6 |
| | Discipline Specific Elective -6 | DSE-3B | 6 |
| Total Credits | | | 120 |

**Core Papers: Computer Science (Credit: 06 each)** (1 period / week for tutorials or 4 periods / week of practical)

1. Problem Solving using Computer        (4 + 4 Lab)
2. Database Management Systems        (4 + 4 Lab)
3. Operating System        (4 + 4 Lab)
4. Computer System Architecture        (4 + 4 Lab)

**Discipline Specific Elective Papers: (Credit: 06 each) (DSE-1, DSE -2)**
**Choose Any 2:**

1. Programming in JAVA        (4 + 4 Lab)
2. Discrete Structures        (5 + 1 Tutorial)
3. Analysis of Algorithms and Data Structures    (4 + 4 Lab)
4. Software Engineering        (4 + 4 Lab)
5. Computer Networks        (4 + 4 Lab)
6. Internet Technologies        (4 + 4 Lab)
7. Data Mining        (4 + 4 Lab)
8. Mobile Applications        (4 + 4 Lab)
9. E-Commerce Technologies        (4+ 4 Lab)
10. Cloud Computing        (4+4 Lab)
11. Project Work / Dissertation        (2+ 8 Lab)

**Note:** Universities may include more options or delete some from this list

**Skill Enhancement Courses (any four) (Credit: 02 each) – SEC1 to SEC4**
**Choose 4.**

1. Office Automation Tools        (1+2 Lab)
2. HTML Programming        (1+2 Lab)
**3.** MySQL (SQL/PL-SQL)        (1+2 Lab)
4. Multimedia and Applications        (1+2 Lab)
5. PHP Programming        (1+2 Lab)
**6.** Programming in Visual Basic/GAMBAS        (1+2 Lab)
7. System Administration and Maintenance        (1+2 Lab)
8. Programming in SCILAB        (1+2 Lab)
9. Software Testing Concepts        (1+2 Lab)
10. Android Programming        (1+2 Lab)
11. XML Programming        (1+2 Lab)
12. R Programming        (1+2 Lab)

**Note:** Universities may include more options or delete some from this list

**Important:**

1. Each University/Institute should provide a brief write-up about each paper outlining the salient features, utility, learning objectives and prerequisites.

2. University/Institute can add/delete some experiments of similar nature in the Laboratory papers.

3. The size of the practical group for practical papers is recommended to be 10-15 students.

4. University/Institute can add to the list of reference books given at the end of each paper.


**CORE PAPERS:**

# Core Paper I :Semester-I:
# DSC-1A
## 1. Problem Solving using Computers

**Computer Fundamentals:** Introduction to Computers: Characteristics of Computers, Uses of computers, Types and generations of Computers. (3L)

Basic Computer Organization - Units of a computer, CPU, ALU, memory hierarchy, registers, I/O devices. (4L)

**Planning the Computer Program:** Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation. (3L)

**Techniques of Problem Solving:** Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.
(4L)

**Overview of Programming:** Structure of a Python Program, Elements of Python (4L)

**Introduction to Python:** Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).
(8L)

**Creating Python Programs:** Input and Output Statements, Control statements (Looping- while Loop, for Loop , Loop Control, Conditional Statement- if...else, Difference between break, continue and pass). (10L)

**Structures:** Numbers, Strings, Lists, Tuples, Dictionary, Date & Time, Modules, Defining Functions, Exit function, default arguments. (10L)

**Introduction to Advanced Python:** Objects and Classes, Inheritance, Regular Expressions, Event Driven Programming, GUI Programming.
        (14L)

## Reference Books:

1.  P. K. Sinha & Priti Sinha , "Computer Fundamentals", BPB Publications, 2007.
2.  Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
3.  T. Budd, Exploring Python, TMH, 1st Ed, 2011
4.  Python Tutorial/Documentation www.python.or 2010
5.  Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012

6.  http://docs.python.org/3/tutorial/index.html
7.  http://interactivepython.org/courselib/static/pythonds
8.  http://www.ibiblio.org/g2swap/byteofpython/read/

## Software Lab using Python:

### Section: A ( Simple programs)
1.  Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2.  WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :
        Grade A: Percentage >=80
        Grade B: Percentage>=70 and <80
        Grade C: Percentage>=60 and <70
        Grade D: Percentage>=40 and <60
        Grade E: Percentage<40
3.  Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4.  WAP to display the first n terms of Fibonacci series.
5.  WAP to find factorial of the given number.
6.  WAP to find sum of the following series for n terms:    1 – 2/2! + 3/3! -  - - - - n/n!
7.  WAP to calculate the sum and product of two compatible matrices.

### Section: B (Visual Python):
*All the programs should be written using user defined functions, wherever possible.*

1.  Write a menu-driven program to create mathematical 3D objects
    I.   curve
    II.  sphere

III. cone
IV. arrow
V. ring
VI. Cylinder.

2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.
4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula $m=60/(t+2)$, where t is the time in hours. Sketch a graph for t vs. m, where t>=0.
6. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:

   $P(t) = (15000(1+t))/(15+ e)$

   where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.

7. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
   I. velocity wrt time (v=u+at)
   II. distance wrt time ( s=u*t+0.5*a*t*t)
   III. distance wrt velocity ( s=(v*v-u*u)/2*a )

# Core Paper II :Semester-II:
# DSC-2A
## 2. Database Management Systems

**Introduction to Database Management Systems**: Characteristics of database approach, data models, DBMS architecture and data independence.

(10L)

**Entity Relationship and Enhanced ER Modeling:** Entity types, relationships, SQL-99:Schema Definition , constraints, and object modeling.
(15L)

**Relational Data Model :** Basic concepts, relational constraints, relational algebra, SQL queries.
(15L)

**Database design:** ER and EER to relational mapping, functional dependencies, normal forms up to third normal form. (20 L)

**Books Recommended:**

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6$^{th}$ Edition, Pearson Education, 2010.

2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3$^{rd}$ Edition, McGraw-Hill, 2002.

3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6$^{th}$ Edition, McGraw Hill, 2010.

4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6$^{th}$ Edition, Pearson Education,2013.

## Software Lab based on Database Management Systems

**Note: MyAccess/MySQL may be used.**
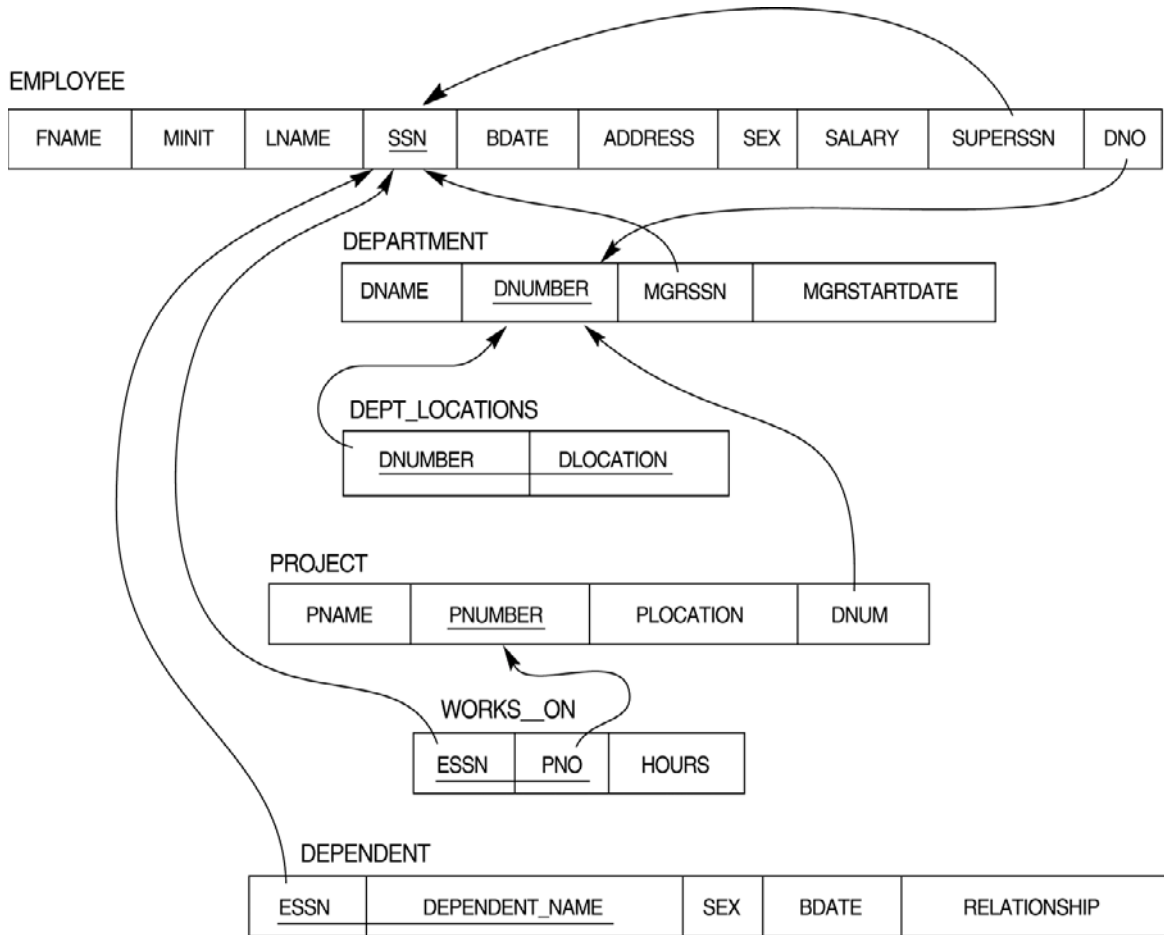
The following concepts must be introduced to the students:
   **DDL Commands**
   - Create table, alter table, drop table
   **DML Commands**
   - Select , update, delete, insert statements
   - Condition specification using Boolean and comparison operators (and, or, not,=,<>,>,<,>=,<=)
   - Arithmetic operators and aggregate functions(Count, sum, avg, Min, Max)
   - Multiple table queries (join on different and same tables)
   - Nested select statements
   - Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
   - Categorization using group by........having
   - Arranging using order by

# Relational Database Schema - COMPANY

**EMPLOYEE**

| FNAME | MINIT | LNAME | SSN | BDATE | ADDRESS | SEX | SALARY | SUPERSSN | DNO |
|-------|-------|-------|-----|-------|---------|-----|--------|----------|-----|

**DEPARTMENT**

| DNAME | DNUMBER | MGRSSN | MGRSTARTDATE |
|-------|---------|--------|--------------|

**DEPT_LOCATIONS**

| DNUMBER | DLOCATION |
|---------|-----------|

**PROJECT**

| PNAME | PNUMBER | PLOCATION | DNUM |
|-------|---------|-----------|------|

**WORKS_ON**

| ESSN | PNO | HOURS |
|------|-----|-------|

**DEPENDENT**

| ESSN | DEPENDENT_NAME | SEX | BDATE | RELATIONSHIP |
|------|----------------|-----|-------|--------------|

## Questions to be performed on above schema

1. Create tables with relevant  foreign key constraints

2. Populate the tables with data

3. Perform the following queries on the database :

   1. Display all the details of all employees working in the company.

   2. Display ssn, lname, fname, address of employees who work in department no 7.

   3. Retrieve the birthdate and address of the employee whose name is  'Franklin T. Wong'

   4. Retrieve the name and salary of every employee

   5. Retrieve all distinct salary values

   6. Retrieve all employee names whose address is in 'Bellaire'

7. Retrieve all employees who were born during the 1950s

8. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)

9. Retrieve the names of all employees who do not have supervisors

10. Retrieve SSN and department name for all employees

11. Retrieve the name and address of all employees who work for the 'Research' department

12. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birthdate.

13. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.

14. Retrieve all combinations of Employee  Name and Department Name

15. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.

16. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.

17. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.

18. Select the names of employees whose salary does not match with salary of any employee in department 10.

19. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.

20. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.

21. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.

22. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.

23. Select the names of employees whose salary is greater than the average salary of all employees in department 10.

24. For each department, retrieve the department number, the number of employees in the department, and their average salary.

25. For each project, retrieve the project number, the project name, and the number of employees who work on that project.

26. Change the location and controlling department number for all projects having more than 5 employees to 'Bellaire' and 6 respectively.
27. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.
28. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table.

29. Delete all dependents of employee whose ssn is '123456789'.

30. Delete an employee from Employee table with ssn = '12345'( make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL

31. Perform a query using alter command to drop/add field and a constraint in Employee table.

# Core Paper III :Semester-III:
## DSC-3A
## 3. Operating Systems

**Introduction:** System Software, Resource Abstraction, OS strategies.          (2L)

**Types of operating systems** - Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Process Control & Real Time Systems.          (2L)

**Operating System Organization**: Factors in operating system design, basic OS functions, implementation consideration; process modes, methods of requesting system services – system calls and system programs.          (10L)

**Process Management :** System view of the process and resources, initiating the OS, process address space, process abstraction, resource abstraction, process hierarchy, Thread model  (15L)
**Scheduling:** Scheduling Mechanisms, Strategy selection, non-pre-emptive and pre-emptive strategies.          (12L)

**Memory Management:** Mapping address space to memory space, memory allocation strategies, fixed partition, variable partition, paging, virtual memory          (12L)

**Shell introduction and Shell Scripting**
          **(7L)**

➢ What is shell and various type of shell, Various editors present in linux
➢ Different modes of operation in vi editor
➢ What is shell script, Writing and executing the shell script
➢ Shell variable (user defined and system variables)
➢ System calls, Using system calls

- ➢ Pipes and Filters
- ➢ Decision making in Shell Scripts (If else, switch), Loops in shell
- ➢ Functions
- ➢ Utility programs (cut, paste, join, tr , uniq utilities)
- ➢ Pattern matching utility (grep)

# Books Recommended:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
4. W. Stallings, Operating Systems, Internals & Design Principles , 5th Edition, Prentice Hall of India. 2008.
5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

# Software Lab based on Operating Systems

**Note: Following exercises can be performed using Linux or Unix**

1. Usage of following commands:
   ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.

2. Usage of following commands:
   cal, cat(append), cat(concatenate), mv, cp, man, date.

3. Usage of following commands:
   chmod, grep, tput (clear, highlight), bc.

4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify "cal" command to display calendars of the specified months.
6. Write a shell script to modify "cal" command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name is invalid".
8. Write a shell script to display date in the mm/dd/yy format.
9. Write a shell script to display on the screen sorted output of "who" command along with the total number of users .
10. Write a shell script to display the multiplication table any number,
11. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
12. Write a shell script to find the sum of digits of a given number.
13. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.
14. Write a shell script to find the LCD(least common divisor) of two numbers.
15. Write a shell script to perform the tasks of basic calculator.
16. Write a shell script to find the power of a given number.

17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file have all the permissions or not.
20. Program to show the pyramid of special character "*".

# Core Paper IV :Semester-IV: DSC-4A

## 4. Computer System Architecture

**Introduction:** Logic gates, boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexors, registers, counters and memory units.
(12L)

**Data Representation and basic Computer Arithmetic:** Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison. (8L)

**Basic Computer Organization and Design:** Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt.
(18L)

**Central Processing Unit:** Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. (10L)

**Programming the Basic Computer:** Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming. (8L)
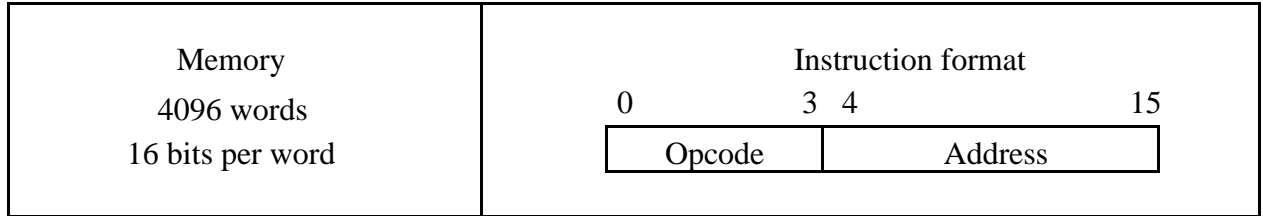
**Input-output Organization:** Peripheral devices, I/O interface, Modes of data transfer, direct memory access. (4L)

### Books Recommended:

1. M. Mano, Computer System Architecture, Pearson Education 1992.
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004
3. W. Stallings, Computer Organization and Architecture Designing for Performance, 8th Edition, Prentice Hall of India ,2009
4. Digital Design, M.M. Mano, Pearson Education Asia, 1979

# Computer System Architecture Lab
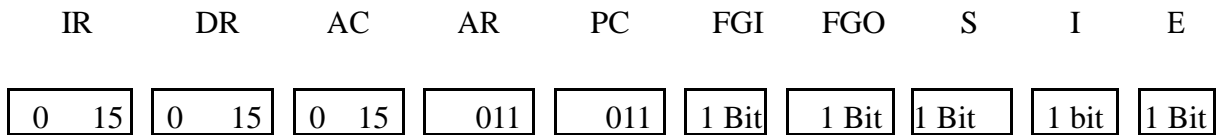
**Practical: 60 Lab Periods**

| Memory | Instruction format |
|---|---|
| 4096 words<br>16 bits per word | 0        3   4            15<br>Opcode       Address |

Basic Computer Instructions

| Memory Reference | Register Reference | Input-Output |
|---|---|---|

1. Create a machine based on the following architecture:

Register Set

| IR | DR | AC | AR | PC | FGI | FGO | S | I | E |
|---|---|---|---|---|---|---|---|---|---|
| 0   15 | 0   15 | 0   15 | 011 | 011 | 1 Bit | 1 Bit | 1 Bit | 1 bit | 1 Bit |

| Symbol | Hex | | Symbol | Hex | Symbol | Hex |
|---|---|---|---|---|---|---|
| AND | 0xxx | | CLA | E800 | INP | F800 |
| ADD | 2xxx | | CLE | E400 | OUT | F400 |
| ISZ | Cxxx | | INC | E020 | | |
| AND_I | 1xxx | Indirect Addressing | SPA | E010 | | |
| ADD_I | 3xxx | | SNA | E008 | | |
| LDA_I | 5xxx | | SZA | E004 | | |
| STA_I | 7xxx | | SZE | E002 | | |
| BUN_I | 9xxx | | HLT | E001 | | |
| BSA_I | Bxxx | | | | | |
| ISZ_I | Dxxx | | | | | |

Refer to Chapter-5 of Morris Mano for description of instructions.

ii) Create the micro operations and associate with instructions as given in the chapter (except interrupts). Design the register set, memory and the instruction set. Use this machine for the assignments of this section.

iii) Create a Fetch routine of the instruction cycle.

iv) Simulate the machine to determine the contents of AC, E, PC, AR and IR registers in hexadecimal after the execution of each of following register reference instructions:

|  |  |  |
|---|---|---|
| a. CLA | e. CIR | i. SNA |
| b. CLE | f. CIL | j. SZA |
| c. CMA | g. INC | k. SZE |
| d. CME | h. SPA | l. HLT |

Initialize the contents of AC to $(A937)_{16}$, that of PC to $(022)_{16}$ and E to 1.

5.  Simulate the machine for the following memory-reference instructions with I= 0 and address part = 082. The instruction to be stored at address 022 in RAM. Initialize the memory word at address 082 with the operand B8F2 and AC with A937. Determine the contents of AC, DR, PC, AR and IR in hexadecimal after the execution.

|  |  |
|---|---|
| a. ADD | f. BSA |
| b. AND | g. ISZ |
| c. LDA |  |
| d. STA |  |
| e. BUN |  |

6.  Simulate the machine for the memory-reference instructions referred in above question with I= 1 and address part = 082. The instruction to be stored at address 026 in RAM. Initialize the memory word at address 082 with the value 298. Initialize the memory word at address 298 with operand B8F2 and AC with A937. Determine the contents of AC, DR, PC, AR and IR in hexadecimal after the execution.

7.  Modify the machine created in Practical 1 according to the following instruction format:

**Instruction format**

| 0 | 2 3 | 4 | 15 |
|---|---|---|---|
| Opcode | I | Address | |
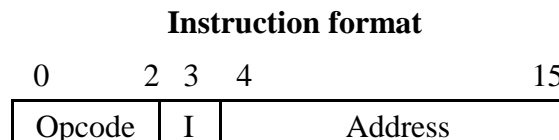
a.  The instruction format contains a 3-bit opcode, a 1-bit addressing mode and a 12-bit address. There are only two addressing modes, I = 0 (direct addressing) and I = 1 (indirect addressing).

b.  Create a new register I of 1 bit.

c. Create two new microinstructions as follows :

    i. Check the opcode of instruction to determine type of instruction (Memory Reference/Register Reference/Input-Output) and then jump accordingly.
    ii. Check the I bit to determine the addressing mode and then jump accordingly.

## Discipline Specific Elective Papers: (Credit: 06 each) (DSE-1, DSE -2):

## Options for Discipline Specific Elective Papers, choose two:

1. Programming in JAVA (4 + 4 Lab)
2. Discrete Structures (5 + 1 Tutorial)
3. Analysis of Algorithms and Data Structures (4 + 4 Lab)
4. Software Engineering (4 + 4 Lab)
5. Computer Networks (4 + 4 Lab)
6. Internet Technologies (4 + 4 Lab)
7. Data Mining (4 + 4 Lab)
8. Mobile Applications (4 + 4 Lab)
9. E-Commerce Technologies (4+ 4 Lab)
10. Cloud Computing (4+4 Lab)
11. Project Work / Dissertation (2+ 8 Lab)

**Note:** Universities may include more options or delete some from this list

## 1. Programming in Java

**Introduction to Java**: Features of Java, JDK Environment     (1L)

**Object Oriented Programming Concept** Overview of Programming, Paradigm, Classes, Abstraction, Encapsulation, Inheritance, Polymorphism, Difference between C++ and JAVA
    (10L)
**Java Programming Fundamental :**Structure of java program, Data types, Variables, Operators, Keywords, Naming Convention, Decision Making (if, switch),Looping(for, while) ,Type Casting
    (10L)
**Classes and Objects:** Creating Classes and objects, Memory allocation for objects, Constructor, Implementation of Inheritance, Implementation of Polymorphism, Method Overloading, Method Overriding, Nested and Inner classes     (10L)

**Arrays and Strings:** Arrays, Creating an array, Types of Arrays, String class Methods, String Buffer methods.
    (6L)
**Abstract Class, Interface and Packages:** Modifiers and Access Control, Abstract classes and methods, Interfaces, Packages Concept, Creating user defined packages     (8L)

**Exception Handling:** Exception types, Using try catch and multiple catch, Nested try, throw, throws and finally, Creating User defined Exceptions. (4L)

**File Handling:** Byte Stream, Character Stream, File IO Basics, File Operations, Creating file, Reading file, Writing File (5L)

**Applet Programming:** Introduction, Types Applet, Applet Life cycle, Creating Applet, Applet tag (6L)

## Books Recommended:
1. Ivan Bayross, Web Enabled Commercial Application Development Using Html, Dhtml,javascript, Perl Cgi , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3rd Edition., 2009
3. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
4. E Balagurusamy , Programming with JAVA, TMH, 2007

## Software Lab based on Java

1. WAP to find the largest of n natural numbers.
2. WAP to find whether a given number is prime or not.
3. Write a menu driven program for following:
   a. Display a Fibonacci series
   b. Compute Factorial of a number
   c. WAP to check whether a given number is odd or even.
   d. WAP to check whether a given string is palindrome or not.
4. WAP to print the sum and product of digits of an Integer and reverse the Integer.
5. Write a program to create an array of 10 integers. Accept values from the user in that array. Input another number from the user and find out how many numbers are equal to the number passed, how many are greater and how many are less than the number passed.
6. Write a program that will prompt the user for a list of 5 prices. Compute the average of the prices and find out all the prices that are higher than the calculated average.
7. Write a program in java to input N numbers in an array and print out the Armstrong numbers from the set.
8. Write java program for the following matrix operations:
   a. Addition of two matrices
   b. Summation of two matrices
   c. Transpose of a matrix
   d. Input the elements of matrices from user.
9. Write a java program that computes the area of a circle, rectangle and a Cylinder using function overloading.
10. Write a Java for the implementation of Multiple inheritance using interfaces to calculate the area of a rectangle and triangle.
11. Write a java program to create a frame window in an Applet. Display your name, address and qualification in the frame window.
12. Write a java program to draw a line between two coordinates in a window.
13. Write a java program to display the following graphics in an applet window.
   a. Rectangles

b. Circles
c. Ellipses
d. Arcs
e. Polygons
14. Write a program that reads two integer numbers for the variables a and b. If any other character except number (0-9) is entered then the error is caught by NumberFormatException object. After that ex.getMessage() prints the information about the error occurring causes.
15. Write a program for the following string operations:
    a. Compare two strings
    b. Concatenate two strings
    c. Compute length of a string
16. Create a class called Fraction that can be used to represent the ratio of two integers. Include appropriate constructors and methods. If the denominator becomes zero, throw and handle an exception.

## 2. Discrete Structures

**Introduction:** Introduction to Sets, Finite and Infinite Sets, Unaccountably Infinite Sets. Introduction to Functions and relations, Properties of Binary relations, Closure, Partial Ordering Relations.                                                      (12L)

**Unit-II:** Pigeonhole Principle, Permutation and Combinations, Mathematical Induction, Principle of Inclusion and Exclusion.                                              (12L)

**Unit-III** : Asymptotic Notations                                                         (4)

**Recurrence Relations**: Introduction, Generating Functions, Linear Recurrence Relations with constant coefficients and their solution.                                       (12L)

**Graphs Theory**: Basic Terminology of Graphs, Models and Types, Multigraphs, Weighted Graphs, Graph Representation. Graph Isomorphism Graph Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Basic Terminology of Trees, Properties of Trees, Spanning Trees.
                                                                                  (12L)

**Inference Theory**: Introduction, Logical Connectives, Well Formed Formulas, Tautologies, Equivalence                                                                      (8L)

## Books Recommended:

1. C. L. Liu and D.P. Mohapatra, Elements of Discrete Mathematics, Third Edition, Tata McGraw Hill , 2008.
2. K. Rosen, Discrete Mathematics and Its Applications, Sixth Edition, Tata McGraw Hill,2007.

3. T.H. Cormen, C.E. Leiserson, R.L. Rivest, Introduction to Algorithms, Third Edition,Prentice Hall of India,2010.
4. J.P. Trembley, R. Manohar, Discrete Mathematical Structures with Application to Computer Science, First Edition, Tata McGraw Hill, 2001.
5. David Gries, Fred B. Schneider, A Logical Approach to Discrete Math, Springer;   , 2010.

## Online Reading/Supporting Material:

1. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer- science-fall-2005/

## 3. Analysis of Algorithm and Data Structures

**Introduction**: Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm
(4L)
**Algorithm Design Techniques**: Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms. (6L)
**Sorting Techniques**: Elementary sorting techniques-Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques-Heap Sort, Quick Sort, Sorting in Linear Time-Bucket Sort, Radix Sort and Count Sort (10L)

**Searching Techniques:** Linear and Binary search. (4L)
**Complexity Analysis**: Medians & Order Statistics. (4L)

**Data Structures:**

1. Arrays (4 Lectures)
   Single and Multi-dimensional Arrays, Sparse Matrices

2. Stacks (5 Lectures)
   Implementing stack using array and linked list, Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another;

3. Queues (5 Lectures)
   Array and Linked representation of Queue, De-queue, Priority Queues

4. Linked Lists (5 Lectures)
   Singly, Doubly and Circular Lists, representation of Stack and Queue as Linked Lists.

5. Recursion                                                              (5 lectures)
   Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion;

6. Trees                                                                  (5 Lectures)
   Introduction to Tree as a data structure; Binary Trees, Binary Search Tree, (Creation, and Traversals of Binary Search Trees)

## Recommended Books:

1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein-Introduction to Algorithms, PHI, 3rd Edition 2009.
2. Sarabasse & A.V. Gelder Computer Algorithm –Introduction to Design and Analysis,Publisher–Pearson 3rd Edition 1999.
3. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning, 2012.
4. SartajSahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
5. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C++:, Second edition, PHI, 2009.
6. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.
7. D.S Malik, Data Structure using C++,Second edition, Cengage Learning, 2010.

## Software Lab based on Analysis of Algorithms:

1. Implement Insertion Sort (The program should report the number of comparisons)
2. Implement Merge Sort(The program should report the number of comparisons)
3. Implement Heap Sort (The program should report the number of comparisons)
4. Implement Randomized Quick sort (The program should report the number of comparisons)
5. Implement Radix Sort.
6. Implement Searching Techniques
7. Implementation of Recursive function.
8. Array and Linked list implementation of Stack and Queue.
9. Implementation of Single, Double and circular Linked List
10. Creation and traversal of Binary Search Tree.

## 4. Software Engineering

**Software Process:** Introduction ,S/W Engineering Paradigm , life cycle models (water fall, incremental, spiral, evolutionary, prototyping, object oriented) , System engineering, computer

based system, verification, validation, life cycle process, development process, system engineering hierarchy.
(8L)

**Software requirements:** Functional and non-functional , user, system, requirement engineering process, feasibility studies, requirements, elicitation, validation and management, software prototyping, prototyping in the software process, rapid prototyping techniques, user interface prototyping, S/W document. Analysis and modeling, data, functional and behavioral models, structured analysis and data dictionary. (10L)

**Design Concepts and Principles:** Design process and concepts, modular design, design heuristic, design model and document, Architectural design, software architecture, data design, architectural design, transform and transaction mapping, user interface design, user interface design principles. Real time systems, Real time software design, system design, real time executives, data acquisition system, monitoring and control system.
(12L)

**Software Configuration Management:** The SCM process, Version control, Change control, Configuration audit, SCM standards. (8L)

**Software Project Management:** Measures and measurements, S/W complexity and science measure, size measure, data and logic structure measure, information flow measure. Estimations for Software Projects, Empirical Estimation Models, Project Scheduling. (8L)

**Testing:** Taxonomy of software testing, levels, test activities, types of s/w test, black box testing testing boundary conditions, structural testing, test coverage criteria based on data flow, mechanisms, regression testing, testing in the large. S/W testing strategies, strategic approach and issues, unit testing, integration testing, validation testing, system testing and debugging.
(8L)

**Trends in Software Engineering:** Reverse Engineering and Re-engineering – wrappers – Case Study of CASE tools. (6L)

**Books Recommended:**

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill
2. Ian Sommerville, Software engineering, Pearson education Asia, 6th edition, 2000.
3. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
4. James F Peters and Witold Pedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
5. Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxfor University Press, New Delhi, 1996.
6. Pfleeger, "Software Engineering", Pearson Education India, New Delhi, 1999.
   Carlo Ghezzi, Mehdi Jazayari and Dino Mandrioli, "Fundamentals of Software Engineering", Prentice Hall of India, New Delhi, 1991.

**Lab based on Software Engineering**

1. Practical Title

- Problem Statement,
- Process Model

2. Requirement Analysis

- Creating a Data Flow
- Data Dictionary,
- Use Cases

3. Project Management

- Computing FP
- Effort
- Schedule, Risk Table, Timeline chart

4. Design Engineering

- Architectural Design
- Data Design, Component Level Design

5. Testing
- Basis Path Testing

Sample Projects

- DTC Route Information: Online information about the bus routes and their frequency and fares
- Car Pooling: To maintain a web based intranet application that enables the corporate employees within an organization to avail the facility of carpooling effectively.
- Patient Appointment and Prescription Management System
- Organized Retail Shopping Management Software
- Parking Allocation System
- Wholesale Management System

# 5. Computer Networks

**Basic concepts** : Components of data communication, standards and organizations, Network Classification, Network Topologies ; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite. (16L)

**Physical Layer** : Cabling, Network Interface Card, Transmission Media Devices- Repeater, Hub, Bridge, Switch, Router, Gateway. (6L)

**Data Link Layer** : Framing techniques; Error Control; Flow Control Protocols; Shared media protocols - CSMA/CD and CSMA/CA. (8L)

**Network Layer** : Virtual Circuits and Datagram approach, IP addressing methods – Subnetting; Routing Algorithms (adaptive and non-adaptive) (8L)

**Transport Layer:**  Transport services, Transport Layer protocol of TCP and UDP          (6L)

 **Application Layer** : Application layer protocols and services – Domain name system, HTTP, WWW, telnet, FTP, SMTP                                                                                              (10L)

**Network Security** : Common Terms, Firewalls, Virtual Private Networks                   (6L)

## Books Recommended:

1.  B.A. Forouzan: Data Communication and Networking, 4th Edition, Tata McGraw Hill, 2007.

2.  D.E. Comer, Internetworking with TCP/IP, Vol. I, Prentice Hall of India, 1998.

3.  W. Stalling, Data & Computer Communication, 8th edition, Prentice Hall of India, 2006.

4.  D. Bertsekas, R. Gallager, Data Networks, 2nd edition, Prentice Hall of India, 1992.

## Software Lab based on Computer Networks:

Implement the concepts of Computer Networks such as:
1. Simulate Checksum Algorithm.
2. Simulate CRC   Algorithm
3. Simulate Stop &amp; Wait   Protocol.
4. Simulate Go-Back-N  Protocol.
5. Simulate Selective Repeat   Protocol.
 **and so on….**

## 6.  Internet Technologies

**Introduction to Web Design**: Introduction to hypertext markup language (html) document type definition, creating web pages, graphical elements, lists, hyperlinks, tables, web forms, inserting images, frames.                                                                          (6L)

**Customized Features:** Cascading style sheets, (css) for text formatting and other manipulations.                                                                                            (4L)

**JavaScript:** Data types, operators, functions, control structures, events and event handling.                                                                                            (8L)

**Java:** Use of Objects, Array and Array List class, Designing classes, Inheritance, Input/Output, Exception Handling.                                                              (12L)

**JDBC:** JDBC Fundamentals, Establishing Connectivity and working with connection interface,Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.

(10L)

**JSP:** Introduction to JavaServer Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values

(20L)

Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.  (10L)

## Books Recommended:

1. Web Enabled Commercial Application Development Using Html, Dhtml, javascript, Perl Cgi By Ivan Bayross, BPB Publications, 2009.

2. BIG Java Cay Horstmann, Wiley Publication , 3rd Edition., 2009

3. Java 7 ,The Complete Reference, Herbert Schildt, 8th Edition, 2009.

4. The Complete Reference J2EE, TMH, Jim Keogh, 2002.

5. Java Server Pages, Hans Bergsten, Third Edition, O'Reilly Media December 2003.

## Software Lab based on Internet Technologies

**JAVA Script**

1. Create a student registration form. Create functions to perform the following checks:
   a. Roll number is a 7-digit numeric value
   b. Name should be an alphabetical value(String)
   c. Non-empty fields like DOB
2. Implement a static password protection.
3. Write a java script
   a. To change the colour of text using SetTimeOut()
   b. To move an image across screen using SetInterval()

**JAVA Programs**

1. WAP to find the largest of n natural numbers.
2. WAP to find whether a given number is prime or not.
3. WAP to print the sum and product of digits of an Integer and reverse the Integer.
4. Write a program to create an array of 10 integers. Accept values from the user in that array. Input another number from the user and find out how many numbers are equal to the number passed, how many are greater and how many are less than the number passed.
5. Write java program for the following matrix operations:
   a. Addition of two matrices

      b.  Summation of two matrices

      c.  Transpose of a matrix

      Input the elements of matrices from user

**6.** Write a java program that computes the area of a circle, rectangle and a Cylinder using function overloading.

**JDBC**

   **1.** Create a table 'Student' and 'Teacher' in 'College' database and insert two rows in this newly created table using JDBC API and do the following:

      a.  Update an already created table 'Teacher' in 'College' database by updating a teacher's name, with "Dr." appended before the name, whose name is "Rita".

      b.  Repeat the same thing for all the teachers using PreparedStatement.

      c.  Delete the student with ID=3 from 'Student' database.

      d.  Insert two students to the ResultSet returned by the query which selects all students with FirstName="Ayush". The database must also get updated along with ResultSet.

   **2.** Create a procedure in MySQL to count the number of Rows in table 'Student'. Use Callable Statement to call this method from Java code.

**JSP Practical list**

1.Display the pattern:

   1

   1 2

   1 2 3

Take 'n' in a textbox from user. Display this pattern using

- Scriptlets
- &lt;c:forEach&gt; loop

2. Make two files as follows:

    a. main.html: shows 2 text boxes and 3 radio buttons with values "addition", "subtraction" and "multiplication"

    b. operate.jsp: depending on what the user selects perform the corresponding function (Give two implementations: using request.getParameter() and using expression language)

3. Validate User input entered in a form. The input must include Name, DOB, Email ID, Lucky Number, Favorite food etc. (Refer Chapter 8)

4. Display Good Morning <uname>, Good Afternoon <uname> or Good Evening <uname> based on the current time of the day.

5. Create your custom library which contains two tags: <hello>, <choco>.

Usage of the tags:

- <hello name="Ajay">: Output should be Hello Ajay. It contains a mandatory attribute 'name' which can accept Dynamic value.
- <choco texture="Chewy">: Output should be FiveStar, BarOne.

    <choco texture="Crunchy">: Output should be Munch. KitKat.

That means the mandatory attribute must accept a value, and based on the attributes value, it should give output. You must use a bean ChocoBean for this purpose.


# 7. DATA MINING

**Data Warehousing:** Introduction- Definition and description, need for data ware housing, need for strategic information, failures of past decision support systems, OLTP vs DWH-DWH requirements-trends in DWH-Application of DWH.                    (10L)

**Data Warehousing Architecture:** Reference architecture- Components of reference architecture - Data warehouse building blocks, implementation, physical design process and DWH deployment process. A Multidimensional Data, Model Data Warehouse Architecture.
                    (10L)

**Data Mining:** Data mining tasks-Data mining vs KDD- Issues in data mining, Data Mining metrics, Data mining architecture - Data cleaning- Data transformation- Data reduction - Data mining primitives.                    (12L)

**Association Rule Mining:** Introduction - Mining single dimensional Boolean association rules from transactional databases - Mining multi-dimensional association rules.
                    (8L)

**Classification and Prediction:** Classification Techniques - Issues regarding classification and prediction - decision tree - Bayesian classification –Classifier accuracy – Clustering – Clustering Methods - Outlier analysis.                    (12L)

**Applications and Other Data Mining Methods:** Distributed and parallel Data Mining Algorithms, Text mining- Web mining.                    (8L)

## Books Recommended:

1. Jiawei Han and Micheline Kamber, " Data Mining Concepts and Techniques", Morgan Kaufmann Publishers, USA, 2006.
2. Berson,"DataWarehousing, Data Mining and OLAP", Tata McGraw Hill Ltd, New Delhi, 2004.
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, , Pearson Education.
4. Arun K Pujari,"Data mining techniques", Oxford University Press, London, 2003.
5. Dunham M H,"Data mining: Introductory and Advanced Topics". Pearson Education, New Delhi, 2003.
6. Mehmed Kantardzic," Data Mining Concepts, Methods and Algorithms", John Wiley and Sons, USA, 2003.
7. Soman K. P., DiwakarShyam, Ajay V., Insight into Data mining: Theory and Practice,  PHI 2006

## Software Lab based on Data Mining:

**Practical List:** Practical are to be done using Weka, and a report prepared as per the format*. The operations are to be performed on built-in dummy data sets of weka and/or the downloadable datasets mentioned in references below. Also wherever applicable, the parameter values are to be varied (upto 3 distinct values). The 'Visualize' tab is to be explored with each operation.

1. **Preprocessing : Apply the following filters –**
   a. **weka>filter>supervised>attributed>**
      AddClassification ,  AttributeSelection, Discretize , NominalToBinary
   b. **weka>filter>supervised>instance:**
      StratifiedRemoveFolds,  Resample
   c. **weka>filter>unsupervised>attribute>**
      Add, AddExpression, AddNoise ,  Center , Discretize , MathExpression , MergeTwoValues , NominalToBinary , NominalToString,  Normalize NumericToBinary , NumericToNominal , NumericTransform , PrincipalComponent , RandomSubset , Remove , RemoveType , ReplaceMissingValues , Standardize

   d. **weka>filter>unsupervised>instance>**
      Normalize , Randomize , Standardize, RemoveFrequentValues, RemoveWithValues , Resample , SubsetByExpression

2. **Explore the 'select attribute' as follows**

   weka>attributeSelection> , FilteredSubsetEval , WrapperSubsetEval

3. **Association mining**

   weka>associations> , Apriori, FPGrowth

4. **Classification****

weka>classifiers>bayes> , NaïveBayes , weka>classifiers>lazy> : IB1 , IBk

weka>classifiers>trees , SimpleCart , RandomTree , ID3

5. **Clustering\*\***

weka>clusters> , SimpleKMeans , FarthestFirst algorithm, DBSCAN, hierarchicalClusterer

## 8. Mobile Applications

**Event Driven Programming:** UI event loop, Threading for background tasks, Outlets / actions, delegation, notification, Model View Controller (MVC) design pattern.                    (7L)
**Mobile application issues**: limited resources (memory, display, network, file system), input / output (multi-touch and gestures), sensors (camera, compass, accelerometer, GPS)          (8L)
**Development tools**: Apple iOS toolchain: Objective-C, Xcode IDE, Interface Builder, Device simulator.                                          (8L)
**Frameworks**: Objective-C and Foundation Frameworks, Cocoa Touch, UIKit, Others: Core Graphics, Core Animation, Core Location and Maps, Basic Interaction.                    (8L)
**Common UI's for mobile devices**: Navigation Controllers, Tab Bars, Table Views, Modal views, UI Layout.
(7L)
**Data Persistence**: Maintaining state between application invocations, File system, Property Lists, SQLite, Core Data
(8L)
**Remote Data-Storage and Communication:**  "Back End" / server side of application, RESTful programming, HTTP get, post, put, delete, database design, server side JavaScript / JSON   (8L)
**Code signing:**  security, Keychain, Developers and App Store License Agreement          (6L)

## Books Recommended:
1. Rajiv Ramnath, Roger Crawfis, and Paolo Sivilotti, Android SDK 3 for Dummies, Wiley, 2011.
2. Valentino Lee, Heather Schneider, and Robbie Schell, Mobile Applications: Architecture, Design, and Development, Prentice Hall, 2004.
3. Brian Fling, Mobile Design and Development, O'Reilly Media, 2009. Maximiliano
4. Firtman, Programming the Mobile Web, O'Reilly Media, 2010.
5. Christian Crumlish and Erin Malone, Designing Social Interfaces, O'Reilly Media, 2009.

**Software Lab based on Mobile Applications:**

1. Installing Android Environment
2. Create Hello World Application
3. Sample Application about Android Resources
4. Sample Application about Layouts
5. Sample Application about Intents
6. Sample Application I about user interfaces
7. Sample Application about Animations
8. Make a Project based on above labs
9. Sample Application about Android Data
10. Sample Application about SQLite I
11. Sample Application about SQLite II
12. Project Presentation

## 9. E-Commerce Technologies

**An introduction to Electronic commerce**: What is E-Commerce (Introduction And Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, 9 Electronic Commerce and Electronic Business(C2C)(C2G,G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C)          (10L)

**The Internet and WWW:** Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov, .net etc.) , Types of Network, Internet Service Provider, World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Baner, Exchange, Shopping Bots
     (10L)

**Internet Security**: Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime( Laws , Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus( How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorisation and Authentication, Firewall, Digital Signature( How it Works)
          (10L)

**Electronic Data Exchange**: Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model,Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash
     (10L)

**Planning for Electronic Commerce**: Planning Electronic Commerce initiates, Linking objectives to business strategies, Measuring cost objectives, Comparing benefits to Costs, Strategies for developing electronic commerce web sites
   (10L)

**Internet Marketing**: The PROS and CONS of online shopping, The cons of online shopping, Justify an Internet business, Internet marketing techniques, The E-cycle of Internet marketing, Personalization e-commerce.                                              (10L)

## Books Recommended:

1. G.S.V.Murthy, E-Commerce Concepts, Models, Strategies- :- Himalaya Publishing House, 2011.
2. Kamlesh K Bajaj and Debjani Nag , E- Commerce , 2005.
   3. Gray P. Schneider , Electronic commerce, International Student Edition, 2011,

   4. HENRY CHAN, RAYMOND LEE, THARAM DILLON, ELIZABETH CHANG

   E-COMMERCE, FUNDAMENTALS AND APPLICATIONS, Wiely Student Edition, 2011

## Software Lab based on E-Commerce Technologies

**E-commerce concepts are to be implemented in developing a website using a combination of following technologies:**

1. HyperText Markup Language (HTML)

2. Cascading Style Sheets (CSS)

3. JavaScript

4. ASP

5. PHP

6. XML

7. Joomla

## 10.Cloud Computing

**Cloud Introduction:** Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud

– Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim. (12L)

**Cloud Services And File System**: Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework. (12L)

**Collaborating With Cloud**:Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing , Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis. 185 CS-Engg&Tech-SRM-2013 (12L)

**Virtualization For Cloud** :Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V. (12L)

**Security, Standards, And Applications** (9 hours)

Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud. (12L)

## Books Recommended:

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz "Cloud Computing " Wiley India Edition,2010

2. John Rittinghouse & James Ransome, "Cloud Computing Implementation Management and Strategy", CRC Press, 2010

3. Antohy T Velte ,Cloud Computing : "A Practical Approach", McGraw Hill,2009

4. Michael Miller, Cloud Computing: "Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2008.

5. James E Smith, Ravi Nair, "Virtual Machines", Morgan Kaufmann Publishers, 2006.

## Online Reading/Supporting Material

1. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing", Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008

2. webpages.iust.ac.ir/hsalimi/.../89.../Cloud%20Common%20standards.pptop ennebula.org,

3. www.cloudbus.org/cloudsim/, http://www.eucalyptus.com/

4. hadoop.apache.org

5. http://hadoop.apache.org/docs/stable/hdfs_design.html

6. http://static.googleusercontent.com/external_content/untrusted_dlcp/researc h.google.com/en//archive/mapreduce-osdi04.pdf

## Software Lab based on Cloud Computing:

1. Create virtual machines that access different programs on same platform.
2. Create virtual machines that access different programs on different platforms.
3. Exploring Google cloud  **for the following**
   a) **Storage**
   b) **Sharing of data**
   c) manage your calendar, to-do lists,
   d)  a document editing tool
4. Exploring Microsoft cloud
5. Exploring Amazon cloud

## 11. Project Work/Dissertation

- This option is to be offered only in $6^{th}$ Semester.
- The students will be allowed to work on any project based on the concepts studied in core/elective or skill based elective courses.
- The group size should be maximum of three (03) students.
- Each group will be assigned a teacher as a supervisor who will handle both their theory as well lab classes.
- A maximum of Four (04) projects would be assigned to one teacher.
- Theory classes will cover project management techniques.

**Skill Enhancement Courses (Choose any four)**

**(Credit: 02 each) – SEC1 to SEC4**

**Theory: 01, Labs: 02**

**Options for Skill Enhancement Courses, Choose any four**

1. Office Automation Tools             (1+2 Lab)
2. HTML Programming                    (1+2 Lab)
**3.** MySQL (SQL/PL-SQL)              (1+2 Lab)
4. Multimedia and Applications         (1+2 Lab)
5. PHP Programming                     (1+2 Lab)
**6.** Programming in Visual Basic/GAMBAS (1+2 Lab)
7. System Administration and Maintenance (1+2 Lab)
8. Programming in SCILAB               (1+2 Lab)
9. Software Testing Concepts           (1+2 Lab)
10. Android Programming                (1+2 Lab)
11. XML Programming                    (1+2 Lab)
12. R Programming                      (1+2 Lab)

**Note:** Universities may include more options or delete some from this list

**Detailed Syllabus:**

## 1. Office Automation Tools

**Introduction to open office/MS office/Libre office  (2L)**

**Word Processing**: Formatting Text, Pages, Lists, Tables (5L)

**Spreadsheets**: Worksheets, Formatting data, creating charts and graphs, using formulas and functions, macros, Pivot Table (6L)

**Presentation Tools**: Adding and formatting text, pictures, graphic objects, including charts, objects, formatting slides, notes, hand-outs, slide shows, using transitions, animations (4L)

## Books Recommended:

1. Sushila Madan , Introduction to Essential tools,JBA,2009.
2. Anita Goel, Computer Fundamentals, Pearson, 2012

## Computer Lab Based on Office Automation:

**Practical List for WORD:**

1. Create a **telephone directory**.

   - The heading should be 16-point Arial Font in bold
   - The rest of the document should use 10-point font size
   - Other headings should use 10-point Courier New Font.
   - The footer should show the page number as well as the date last updated.

2. Design a time-table form for your college.

   - The first line should mention the name of the college in 16-point Arial Font and should be bold.
   - The second line should give the course name/teacher's name and the department in 14-point Arial.
   - Leave a gap of 12-points.
   - The rest of the document should use 10-point Times New Roman font.
   - The footer should contain your specifications as the designer and date of creation.

3. Create the following one page documents.

   (a) Compose a note inviting friends to a get-together at your house, including a list of things to bring with them.

   (b) Design a certificate in landscape orientation with a border around the document.

4. Create the following document: A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.

5. Convert following text to a table, using comma as delimiter

   Type the following as shown (do not bold).
   **Color, Style, Item**
   **Blue, A980, Van**
   **Red, X023, Car**
   **Green, YL724, Truck**

   **Name, Age, Sex**
   **Bob, 23, M**
   **Linda, 46, F**
   **Tom, 29, M**

6. Prepare a grocery list having four columns (Serial number, the name of the product, quantity and price) for the month of April, 06.
   - Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
   - The headings of the columns should be in 12-point and bold.
   - The rest of the document should be in 10-point Times New Roman.

- Leave a gap of 12-points after the title.
7. XYZ Publications plans to release a new book designed as per your syllabus. Design the first page of the book as per the given specifications.
    (a) The title of the book should appear in bold using 20-point Arial font.
    (b) The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
    (c) At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
    (d) The details of the offices of the publisher (only location) should appear in the footer.
8. Create the following one page documents.
    a) Design a Garage Sale sign.
    b) Make a sign outlining your rules for your bedroom at home, using a numbered list.
9.Enter the following data into a table given on the next page.

| Salesperson | Dolls | Trucks | Puzzles |
|---|---|---|---|
| Amit | 1327 | 1423 | 1193 |
| Shivi | 1421 | 3863 | 2934 |
| Om | 5214 | 3247 | 5467 |
| Ananya | 2190 | 1278 | 1928 |
| Anupama | 1201 | 2528 | 1203 |
| Maharshi | 4098 | 3079 | 2067 |

Add a column Region (values: S, N, N, S, S, S) between the Salesperson and Dolls columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:

**Practical List for EXCEL**

Q1.   Create a student worksheet containing roll numbers, names and total marks. Open a document in Word and insert the excel worksheet using:-
   i)      Copy/Paste
   ii)     Embedding
   iii)    Linking

Q2.   The term wise marks for APS class of 20 students are stored in 3 separate sheets named term1, term2 and term3. Create $4^{th}$ worksheet that contains student names and their total and average marks for the entire year. Give proper headings using headers. Make the column headings bold and italic. The $4^{th}$ worksheet should contain college name as the first line. Make it bold, italic and center it.

Q3.   Using a simple pendulum, plot 1-T and 1-$T^2$ graph.

| I | t1 | t2 | t3 | Mean(t) | T=t/20 | $T^2$ |
|---|---|---|---|---|---|---|
| 70 | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 80 | | | | | | |
| 90 | | | | | | |
| 100 | | | | | | |

Q4.    Consider the following employee worksheet:-

| Full Name (First Last) | Grade 1/2/3 | Basic Salary | HRA | PF | Gross | Net | (VA) Vehicle Allowance |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |

HRA is calculated as follows:

| Grade | HRA %(of Basic) |
|---|---|
| 1 | 40% |
| 2 | 35% |
| 3 | 30% |

Gross = Basic + HRA + VA

Net = Gross –PF

PF is 8% for all Grades

VA is 15000, 10000 and 7000 for Grades 1, 2 and 3.

i)      Find max, min and average salary of employees in respective Grade

ii)     Count no. of people where VA>HRA

iii)    Find out most frequently occurring grade.

iv)    Extract records where employee name starts with "A" has HRA>10000

v)     Print Grade wise report of all employees with subtotals of net salary and also grand totals. Use subtotal command.

vi)    Extract records where Grade is 1 or 2 and salary is between 10000 and 20000 both inclusive.

Q5. In a meeting of a marketing department of an organization it has been decided that price of selling an item is fixed at Rs40. It was resolved to increases the sell of more of more items and getting the profit of Rs40,000/.Use Goal Seek of find out how many items you will have to sell to meet your profit figure.

Q6.    To study the variation in volume with pressure for a sample of an air at constant temperature by plotting a graph for P – V and P-I/V. Sample observations are:-

| Pressure(P) | Volume (V) | I/V | PV | P/V |
|---|---|---|---|---|
| 75 | 20 | | | |
| 78.9 | 19 | | | |
| 83.3 | 18 | | | |
| 88.2 | 17 | | | |

Q7. Plot the chart for marks obtained by the students (out of 5) vs. frequency (total number of students in class is 50).

Q8. Create the following worksheet(s) containing an year wise sale figure of five salesmen in

Rs.

| Salesman | 2002 | 2003 | 2004 | 2005 |
|----------|------|------|------|------|
| MOHAN | 10000 | 12000 | 20000 | 50000 |
| MITRA | 15000 | 18000 | 50000 | 60000 |
| SHIKHA | 20000 | 22000 | 70000 | 70000 |
| ROHIT | 30000 | 30000 | 100000 | 80000 |
| MANGLA | 40000 | 45000 | 125000 | 90000 |

Apply the following Mathematical & Statistical functions:
   i) Calculate the commission for each salesman under the condition :-
        a) If total sales is greater than Rs. 3, 00,000/-, then commission is 10% of total sale made by the salesman.
        b) Otherwise, 4% of total sale.
   ii) Calculate the maximum sale made by each salesman.
   iii) Calculate the maximum sale made in each year.
   iv) Calculate the minimum sale made by each salesman.
   v) Calculate the minimum sale made in each year.
   vi) Count the no. of sales persons.
   vii) Calculate the cube of sales made by Mohan in the year 2002.
   viii) Find the difference in sales by salesman Mitra between the year 2002 and 2003.
        Find the absolute value of difference.
   ix) Also calculate the Mode, Stddev, Variance, Median for the sale made by each salesman.
   ix) Calculate the year wise Correlation coefficient between the sales man Mohan and Mitra year wise

Q9.    The following table gives an year wise sale figure of five salesmen in Rs.

| Salesman | 2000 | 2001 | 2002 | 2003 |
|----------|------|------|------|------|
| S1 | 10000 | 12000 | 20000 | 50000 |
| S2 | 15000 | 18000 | 50000 | 60000 |
| S3 | 20000 | 22000 | 70000 | 70000 |
| S4 | 30000 | 30000 | 100000 | 80000 |
| S5 | 40000 | 45000 | 125000 | 90000 |

   v) Calculate total sale year wise.
   vi) Calculate the net sales made by each salesman
   vii) Calculate the commission for each salesman under the condition :-
        c) If total sales is greater than Rs. 4, 00,000/-, then commission is 5% of total sale made by the salesman.
        d) Otherwise, 2% of total sale.
   viii)      Calculate the maximum sale made by each salesman.
   ix) Calculate the maximum sale made in each year.
   x) Draw a bar graph representing the sale made by each salesman.
   xi) Draw a pie graph representing the sale made by salesmen in year 2001.

Q10.   Consider the following worksheet for APS 1$^{st}$ year students:-

| S.No. | Name | PH | CH | BY | MT | CS | Total Marks | % | Grade |
|-------|------|----|----|----|----|----|-------------|---|-------|
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |

Grade is calculated as follows:-

If  % >=90          Grade A
If  % >=80 & <90    Grade B
If  % >=70 & <80    Grade C
If % >=60 & <70     Grade D
Otherwise students will be declared fail.
   i)   Calculate Grade using if function
   ii)  Sort the data according to total marks
   iii) Apply filter to display the marks of the students having more than 65% marks.
   iv)  Draw a pie chart showing % marks scored in each subject by the topper of the class.
   v)   Draw the doughnut chart of the data as in (iv)
   vi)  Enter the S.No. of a student and find out the Grade of the student using VLOOKUP.
   vii) Extract all records where name
         a)  Begins with "A"
         b)  Contains "A"
         c)  Ends with "A"

**Practical List for Power Point:**
   1. Create five Power point slides. Each slide should support different format. In these slides explain areas of applications of IT. Make slide transition time as 10 seconds.
   2. Create five Power Point slides to give advantages/disadvantages of computer, application of computers and logical structure of computer.
   3. Create five Power Point slides detailing the process of internal assessment. It should be a self-running demo.

## 2.  HTML Programming

- **Unit-I: Introduction**                                              (1L)
- **Unit-II: The Basics**                                               (2L)
   o   The Head, the Body
   o   Colors, Attributes
   o   Lists, ordered and unordered
- **Unit-III: Links**                                                   (3L)
   o   Introduction
   o   Relative Links, Absolute Links
   o   Link Attributes
   o   Using the ID Attribute to Link Within a Document
- **Unit-IV: Images**                                                   (2L)
   o   Putting an Image on a Page
   o   Using Images as Links
   o   Putting an Image in the Background
- **Unit V: – Tables**                                                  (4L)
   o   Creating a Table

- o Table Headers
- o Captions
- o Spanning Multiple Columns
- o Styling Table
- **Unit VI – Forms** (3L)
  - o Basic Input and Attributes
  - o Other Kinds of Inputs
  - o Styling forms with CSS
  - o Where To Go From Here

## Book Recommended:

1. Introduction to **HTML** and CSS -- O'Reilly , 2010
2. Jon Duckett, HTML and CSS, John Wiely, 2012

## Software Lab Based on HTML:

Q.1 Create an HTML document with the following formatting options:
- I. Bold
- II. Italics
- III. Underline
- IV. Headings (Using H1 to H6 heading styles)
- V. Font (Type, Size and Color)
- VI. Background (Colored background/Image in background)
- VII. Paragraph
- VIII. Line Break
- IX. Horizontal Rule
- X. Pre tag

Q.2 Create an HTML document which consists of:
- I. Ordered List
- II. Unordered List
- III. Nested List
- IV. Image
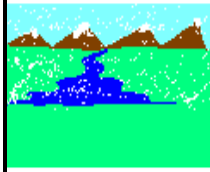
# XYZ Ltd's Update

1. Introduction
2. Company Financial Update
   - First Quarter
   - Second Quarter
   - Third Quarter
   - Fourth Quarter
3. Advertising Update
   - Result of Newspaper Campaign
   - Additions to staff
   - New Thoughts on Television
4. Human Resources Update

A. Saftey Considerations
   1. Body substance isolation
   2. Sense safty
   3. Initial size-up
B. Intitial Patient Assessment
   1. General Impression
   2. Unresponsiveness
      i. Alert to person, place and time
      ii. Verbal response to audible stimuli
      iii. Pain evokes verbal or physical response
      iv. Unresponsive to all stimuli
C. Patient Critical Needs
   1. Airway
   2. Breathing
      i. Use oxygen if indicated
      ii. Consider use of assisting with bag value mask
   3. Circulation
   4. Bleeding

Q.3     Create an HTML document which implements Internal linking as well as External linking.

Q.4     Create a table using HTML which consists of columns for Roll No., Student's name and grade.

| Result | | |
|---|---|---|
| Roll No. | Name | Grade |
|  |  |  |

|  |  |  |
|---|---|---|
|  |  |  |
|  |  |  |
|  |  |  |

**Q.5**    Create a Table with the following view:

|  |  |  |  |  |
|---|---|---|---|---|
|  |  |  | Place an image here ||
|  |  |  |  ||
|  |  |  |  ||

**Q.6**    Create a form using HTML which has the following types of controls:

       I.     Text Box
      II.     Option/radio buttons
     III.     Check boxes
    IV.     Reset and Submit buttons

## Subscribe to XYZ News Magazine and Emails

Interested in receiving daily small updates of all latest News? Well, now you can. And best of all, it is free! Just fill out this form and submit it by clicking the "send it In" button. We will put you on our mailing list and you will receive your first email in 3-5 days.

---

Please fill the following boxes to help us send the emails and our news letter:
First Name:
Last Name:
Business:
We must have a correct e-mail address to send you the news letter:
Email:
How did you hear about XYZ News Magazine and Emails?
⦿ Here on the Web  ◯ In a magazine  ◯ Television  ◯ Other
Would you like to be on our regular mailing list?
☑ Yes, we love junk emails

[ Reset ]  [ Send it in! ]

Q.7    Create HTML documents (having multiple frames) in the following three formats:

| Frame1 |
|:---:|
| Frame2 |

| Frame1 | |
|:---:|:---:|
| Frame2 | Frame3 |

# 3.  MySQL (SQL/PL-SQL)                    (1+2 Lab)

**SQL Vs. SQL * Plus:**

SQL Commands and Data types, Operators and Expressions, Introduction to SQL * Plus. ( 2L)

**Managing Tables and Data:**
- Creating and Altering Tables (Including constraints)
- Data Manipulation Command like Insert, update, delete
- SELECT statement with WHERE, GROUP BY and HAVING, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL BETWEEN, EXISTS, LIKE
- Join, Built in functions                                              (4L)

**Other Database Objects**
- View
- Synonyms, Index                                                      (2L)

**Transaction Control Statements**
- Commit, Rollback, Savepoint                                          (2L)

**Introduction to PL/SQL**
- SQL v/s PL/SQL
- PL/SQL Block Structure
- Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.)
- % TYPE and % ROWTYPE
- Using Cursor (Implicit, Explicit)                                    (5L)

**Books Recommended:**
1. Baron Schwartz , High Performance MySQL,  O'Reilly, 2012.
2. Vikram Vaswani , The Complete Reference MySQL , McGraw Hill Educations, 2004.

## Software Lab Based on MySQL (SQL/PL-SQL):

**[SQL COMMANDS]**

1) SQL* formatting commands

2) To create a table, alter and drop table.

3) To perform select, update, insert and delete operation in a table.

4) To make use of different clauses viz where, group by, having, order by, union and intersection,

5) To study different constraints.

**[SQL FUNCTION]**

6) To use oracle function viz aggregate, numeric, conversion, string function.

7) To understand use and working with joins.

8) To make use of transaction control statement viz rollback, commit and save point.

9) To make views of a table.

10) To make indexes of a table.

 **[PL/SQL]**

11) To understand working with PL/SQL

12) To implement Cursor on a table.

13) To implement trigger on a table

## 4.  Multimedia Applications

**Multimedia**: Introduction to multimedia, Components, Uses of multimedia.          (2L)
**Making Multimedia**: Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia software and Authoring tools.     (4L)
**Text:** Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia &Hypertext.                                                              (2L)
**Images:** Still Images – Bitmaps, Vector Drawing, 3D Drawing & rendering, Natural Light & Colors, Computerized Colors, Color Palletes, Image File Formats.                  (3L)

**Sound:** Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats.         (2L)

**Video:** How Video Works, Analog Video, Digital Video, Video File Formats, Video Shooting and Editing. (2L)

**Animation:** Principle of Animations. Animation Techniques, Animation File Formats. (2L)

## Books Recommended:

1. Tay Vaughan, "Multimedia: Making it work", TMH, Eighth edition. 2006
2. Ralf Steinmetz and Klara Naharstedt, "Multimedia: Computing, Communications Applications", Pearson,1995.
3. Keyes, "Multimedia Handbook", TMH. 2000.
4. K. Andleigh and K. Thakkar, "Multimedia System Design", PHI,2000

## Software Lab Based on Multimedia (FLASH as a multimedia S/W):

Practical exercises based on concepts listed in theory using Flash.

**FLASH**: Concept of Frame, Key frames, Frame rate, Timeline, Tween, Layers, Symbols, Embedding audio/video and embedding on the web page

1. Draw an animation to show a bouncing ball.
2. Draw an animation to show a moving stick man.
3. Draw an animation to show a fainting banana.
4. Draw an animation to show sunrise and sunset.
5. Draw an animation to show a disappearing house.
6. Draw an animation to show two boats sailing in river
7. Draw an animation to show a scene of cricket match.
8. Draw an animation to help teach a poem or a song
9. Draw an animation to show cartoon with a message
10. Make a movie showing Shape Tweening.
11. Make a movie showing Motion Tweening.
12. Add sound and button to the movie

## 5. PHP Programming (1 +2 Lab)

**Introduction to PHP:** (3L)

 ➢ PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.)
 ➢ PHP with other technologies, scope of PHP
 ➢ Basic Syntax, PHP variables and constants
 ➢ Types of data in PHP , Expressions, scopes of a variable (local, global)
 ➢ PHP Operators : Arithmetic, Assignment, Relational , Logical operators, Bitwise , ternary and MOD operator.
 ➢ PHP operator Precedence and associativity
    **Handling HTML form with PHP:**
 (2L)
 ➢ Capturing Form Data
 ➢ GET and POST form methods
 ➢ Dealing with multi value fields
 ➢ Redirecting a form after submission

**PHP conditional events and Loops:**

<div align="right">(3L)</div>

- ➢ PHP IF Else conditional statements ( Nested IF and Else)
- ➢ Switch case, while ,For and Do While Loop
- ➢ Goto , Break ,Continue and exit
    **PHP Functions:**

<div align="right">(3L)</div>

- ➢ Function, Need of Function , declaration and calling of a function
- ➢ PHP Function with arguments, Default Arguments in Function
- ➢ Function argument with call by value, call by reference
- ➢ Scope of Function Global and Local
    **String Manipulation and Regular Expression:**

<div align="right">(3L)</div>

- ➢ Creating and accessing String , Searching & Replacing String
- ➢ Formatting, joining and splitting String , String Related Library functions
- ➢ Use and advantage of regular expression over inbuilt function
- ➢ Use of preg_match(), preg_replace(), preg_split() functions in regular expression
    **Array:**

<div align="right">(3L)</div>

- ➢ Anatomy of an Array ,Creating index based and Associative array ,Accessing array
- ➢ Looping with Index based array, with associative array using each() and foreach()
- ➢ Some useful Library function

## Software Lab Based on PHP:

1. Create a PHP page using functions for comparing three integers and print the largest number.
2. Write a function to calculate the factorial of a number (non-negative integer). The function accept the number as an argument.
3. WAP to check whether the given number is prime or not.
4. Create a PHP page which accepts string from user. After submission that page displays the reverse of provided string.
5. Write a PHP function that checks if a string is all lower case.
6. Write a PHP script that checks whether a passed string is palindrome or not? ( A palindrome is word, phrase, or sequence that reads the same backward as forward, e.g., madam or nurses run)
7. WAP to sort an array.
8. Write a PHP script that removes the whitespaces from a string.
   Sample string : 'The quick " " brown fox'

   Expected Output : Thequick""brownfox

9. Write a PHP script that finds out the sum of first n odd numbers.
10. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e.name is present in the database) otherwise error message should be displayed.
11. Write a PHP script that checks if a string contains another string.
12. Create a simple 'birthday countdown' script, the script will count the number of days between current day and birth day.

13. Create a script to construct the following pattern, using nested for loop.
    ```
    *
    * *
    * * *
    * * * *
    * * * * *
    ```
14. Write a simple PHP program to check that emails are valid.
15. WAP to print first n even numbers.
16. $color = array('white', 'green', 'red")
    Write a PHP script which will display the colors in the following way :
    Output :
    white, green, red,

    - green
    - red
    - white
17. Using switch case and dropdown list display a "Hello" message depending on the language selected in drop down list.
18. Write a PHP program to print Fibonacci series using recursion.
19. Write a PHP script to replace the first 'the' of the following string with 'That'.

    **Sample :** 'the quick brown fox jumps over the lazy dog.'
    **Expected Result :** That quick brown fox jumps over the lazy dog.


## 6. Programming with VB/GAMBAS

**GUI Environment:** Introduction to graphical user interface (GUI), programming language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs.
**(2L)**

**Controls :** Introduction to controls textboxes, frames, check boxes, option buttons, images, setting borders and styles, the shape control, the line control, working with multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls.
**(4L)**

**Operations:** Data types, constants, named & intrinsic, declaring variables, scope of variables, val function, arithmetic operations, formatting data.
**(2L)**

**Decision Making :** If statement, comparing strings, compound conditions (and, or, not), nested if statements, case structure, using if statements with option buttons & check boxes, displaying message in message box, testing whether input is valid or not**.**
**(4L)**

**Forms Handling :** Multiple forms creating, adding, removing forms in project, hide, show method, load, unload statement, me keyword, referring to objects on a different forms.
**(2L)**

**Iteration Handling:** Do/loops, for/next loops, using msgbox function, using string function.
**(3L)**

## Book Recommended:

a.      Programming in Visual Basic 6.0 by  Julia Case Bradley, Anita C. Millispangh (Tata Mcgraw Hill Edition 2000 (Fourteenth Reprint 2004)

## Software Lab Based on Visual Basic:

Practical exercises based on concepts listed in theory using VB.

1. Write a VB application to compute the sum of two variables.
2. Write a VB application to compute the factorial of a number n.
3. Write a VB application to compute the Fibonacci series of a number n.
4. Write a VB application to compute the series of prime numbers till number n.
5. Write a VB application to compute the maximum of three numbers.
6. Write a VB application to compute the sum of odd numbers and even numbers in an array of n integers.
7. Write a VB application to compare the strings.
8. Write a VB application to make a calculator.
9. Write a VB application to choose your hobbies from a list.
10. Write a VB application to illustrate the use of color radio button.
11. Write a VB application to illustrate the use of color scroll bar form.
12. Write a VB application to illustrate the use of color scroll bar label text.
13. Write a VB application to illustrate the use of color text box.
14. Write a VB application to show a timer.

## 7. System Administration and Maintenance                  (1+2 Labs)

### Part I  (Linux/Unix)                                                    (8L)

➢ Basics of operating system, services,
➢ Installation and configuration, maintenance
➢ What is linux/unix Operating systems, Kernel, API, cli, gui,
➢ Difference between linux/unix and other operating systems
➢ Features and Architecture
➢ Linux features, advantages, disadvantages

### Part II (Windows)                                                       (8L)

➢ Windows as operating system, history, versions.
➢ PC hardware, BIOS, Devices and drivers,
➢ Kernal Configuration and building
➢ Application installation, configuration and maintenance
➢ Server services and Client services
➢ Difference between WindowsXP/windows7 and windows server 2003/2008

### Software Lab Based on System Administration and Maintenance Linux:

| Linux Desktop tour. Configuring desktop environment and desktop settings. |
| --- |

| |
|---|
| **Basic Commands :**Terminal, shell,Cat, ls, cd, date, cal, man, echo, pwd, Mkdir, rm, rmdir Ps, kill |
| **Package Installation**<br><br>Synaptic package manager |

## Windows:

| |
|---|
| Creating users – Admin and regular.<br><br>Path of their personal files. Adding and changing passwords.<br><br>Difference between workgroup and domain. Concept of roles.<br><br>user profiles – creating and roaming Concept of Active Directory. Creating active directory in windows 2003/2008. |
| Process and Disk management<br><br>Windows Task manager. File systems – NTFS, FAT. |
| **Services**<br><br>Control Panel<br><br>C:/program Files, C:/system C:/windows<br><br>Add /remove new hardware (like printer ), Add/remove new programmes. |
| **Network Administration**<br><br>Ipconfig,Ping, tracert, route, hostname, net, netstat, whoami<br>Set manual IP address, check connectivity – ipv4, ipv6 |
| **Administrator Tools**<br><br>Control Panel -> Administrative Tools<br><br>Computer Management, Local security Policy, Performance Monitor, Task Scheduler, Antivirus and firewall. |
| **Misc**<br><br>Start->Accessories->System tools -> All options (Remote desktop, backup/restore etc.)<br><br>**LAN** – sharing printer, files and folder over the network. |

## 8. Programming with SCILAB  (1+2Labs)

**Unit I-** Introduction to Programming: Components of a computer, working with numbers, Machine code,   Software hierarchy. (2L)

**Unit II-** Programming Environment: SCILAB Environment, Workspace, Working Directory, Expressions, Constants, Variables and assignment statement, Arrays. (3L)

**Unit III-** Graph Plots: Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save. (2L)

**Unit IV-** Matrices and Some Simple Matrix Operations, Sub- Matrices. (2L)

**Unit IV-** Procedures and Functions: Arguments and return values, (2L)

**Unit V-**Control Statements: Conditional statements: If, Else, Else-if, Repetition statements: While, for loop.
(3L)

**Unit VI-** Manipulating Text: Writing to a text file, Reading from a text file, Randomising and sorting a list, searching a list. (2L)

## Recommended Books:

1. M.Affouf, SCILAB by Example , <span>CreateSpace Independent Publishing Platform,</span>2012
2. H. Ramchandran, A.S. Nair, SCILAB  , S.Chand, 2011

## Software Lab Based on SCILAB:

1. Write a program to assign the following expressions to a variable A and then to print out the value of A.
    a.  (3+4)/(5+6)
    b.  $2\pi^2$
    c.  $\sqrt{2}$
    d.  $(0.0000123 + 5.67\times10^{-3}) \times 0.4567\times10^{-4}$
2. Celsius temperatures can be converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32.  Assign a variable called C the value 37, and implement this formula to assign a variable F the Fahrenheit equivalent of 37 Celsius.
3. Set up a vector called N with five elements having the values: 1, 2, 3, 4, 5. Using N, create assignment statements for a vector X which will result in X having these values:
    a.  2, 4, 6, 8, 10
    b.  1/2, 1, 3/2, 2, 5/2
    c.  1, 1/2, 1/3, 1/4, 1/5
    d.  1, 1/4, 1/9, 1/16, 1/25
4. A supermarket conveyor belt holds an array of groceries.  The price of each product (in pounds) is [ 0.6, 1.2 ,0.5, 1.3 ] ; while the numbers of each product are [ 3, 2 ,1 ,5 ].  Use MATLAB to calculate the total bill.

5. The sortrows(x) function will sort a vector or matrix X into increasing row order. Use this function to sort a list of names into alphabetical order.
6. The "identity" matrix is a square matrix that has ones on the diagonal and zeros elsewhere. You can generate one with the eye() function in MATLAB. Use MATLAB to find a matrix B, such that when multiplied by matrix A=[ 1 2; -1 0 ] the identity matrix I=[ 1 0; 0 1 ] is generated. That is A*B=I.
7. Create an array of N numbers. Now find a single MATLAB statement that picks out from that array the 1,4,9,16,…,√Nth entries, i.e. those numbers which have indices that are square numbers.
8. Draw a graph that joins the points (0,1), (4,3), (2,0) and (5,-2).
9. The seeds on a sunflower are distributed according to the formula below. Plot a small circle at each of the first 1000 co-ordinates :

$$r_n = \sqrt{n}$$

$$\theta_n = \frac{137.51}{180} \pi n$$

10. Calculate 10 approximate points from the function y=2x by using the formulae:
    i.   $x_n = n$
    ii.  $y_n = 2n + rand - 0.5$

    Fit a line of best fit to these points using the function polyfit() with degree=1, and generate co-ordinates from the line of best fit using polyval(). Use the on-line help to find out how to use these functions. Plot the raw data and the line of best fit.
11. Calculate and replay 1 second of a sinewave at 500Hz with a sampling rate of 11025Hz. Save the sound to a file called "ex35.wav". Plot the first 100 samples.
12. Calculate and replay a 2 second chirp. That is, a sinusoid that steadily increases in frequency with time, from say 250Hz at the start to 1000Hz at the end.
13. Build a square wave by adding together 10 odd harmonics: 1f, 3f, 5f, etc. The amplitude of the nth harmonic should be 1/n. Display a graph of one cycle of the result superimposed on the individual harmonics.
14. Write a function called FtoC (ftoc.m) to convert Fahrenheit temperatures into Celsius. Make sure the program has a title comment and a help page. Test from the command window with:
    i.   FtoC(96)
    ii.  lookfor Fahrenheit
    iii. help FtoC
15. Write a program to input 2 strings from the user and to print out (i) the concatenation of the two strings with a space between them, (ii) a line of asterisks the same length as the concatenated strings, and (iii) the reversed concatenation. For example:
    i.    Enter string 1: <u>Mark</u>
    ii.   Enter string 2: <u>Huckvale</u>
    iii.  Mark Huckvale
    iv.   *************
    v.    elavkcuH kraM

## 9.  Concepts of Software Testing                                    (1+2 Labs)

**Introduction**                                                            (4L)

Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System Testing, Basic Terminologies, V Shaped Software Lifecycle Model

**Functional Testing\ Black-box Testing** **(5L)**

Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing

**Structural Testing\ White-box Testing** **(6L)**

Basis Path Testing: Program Graph, DD Path graph, Cyclomatic Complexity, Graph Matrices, Control Flow Testing: Statement Coverage, Branch Coverage, Condition Coverage, Path Coverage

## Books Recommended:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, Seventh Edition, Mc Graw Hill Education.2009.

2. Yogesh Singh, Software Testing, Cambridge University Press,2011.

## Computer Lab Based on Software Testing:

1. Write a program that take three inputs (a,b &c) that represent the sides of a triangle, and the output is one of the below four:

   a. Not a triangle

   b. Scalene triangle

   c. Isosceles triangle

   d. Equilateral triangle

   1.1 Generate test cases using Boundary Value Analysis, Equivalence Class Partitioning and Decision Table Testing.

   1.2 Generate test cases using Basis path testing.

   1.3 Run code coverage tool.

2. Write a program that determines the nature of roots of a quadratic equation. Output should be one of the following:-

   - Not a quadratic equation.
   - Complex roots
   - Real roots
   - Single roots

   I. Generate test cases using Boundary Value Analysis, Equivalence Class Partitioning and Decision Table Testing.

   II. Generate test cases using Basis path testing.

   III. Run code coverage tool

3. Write a program that checks whether the number is even or odd. Run code coverage tool and find the amount of code being covered.

4. Write a program that dynamically allocates memory to10 integers using malloc() or calloc() and

   - donot free memory leading to memory leaks. Verify the same usingValgrind.
   - Now, free memory using free() at the end of the program to avoid memory leaks. Verify the same using Valgrind.
5. Use LoadUI load testing tool to test the web application performance.

## 10.Android Programming

**Introduction:** History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture. (2L)

**Overview of object oriented programming using Java:** OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine. (4L)

**Development Tools:** Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating a android project – Hello Word, run on emulator, Deploy it on USB-connected Android device. (5L)

**User Interface Architecture:** Application context, intents, Activity life cycle, multiple screen sizes.(2L)

**User Interface Design:** Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners (Combo boxes), Images, Menu, and Dialog. (2L)

**Database**: Understanding of SQLite database, connecting with the database. (2L)

**Book Recommended:**

1. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.

## ONLINE READING / SUPPORTING MATERIAL:

1. http://www.developer.android.com
2. http://developer.android.com/about/versions/index.html
3. http://developer.android.com/training/basics/firstapp/index.html
4. http://docs.oracle.com/javase/tutorial/index.htm (Available in the form of free downloadable ebooks also).
5. http://developer.android.com/guide/components/activities.html
6. http://developer.android.com/guide/components/fundamentals.html

7. http://developer.android.com/guide/components/intents-filters.html.
8. http://developer.android.com/training/multiscreen/screensizes.html
9. http://developer.android.com/guide/topics/ui/controls.html
10. http://developer.android.com/guide/topics/ui/declaring-layout.html
11. http://developer.android.com/training/basics/data-storage/databases.html

## Software Lab Based on Android Programming:

1. Create "Hello World" application. That will display "Hello World" in the middle of the screen in the emulator. Also display "Hello World" in the middle of the screen in the Android Phone.
2. Create an application with login module. (Check username and password).
3. Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.
4. Create a menu with 5 options and and selected option should appear in text box.
5. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.
6. Create an application with three option buttons, on selecting a button colour of the screen will change.
7. Create and Login application as above. On successful login, pop up the message.
8. Create an application to Create, Insert, update, Delete and retrieve operation on the database.

## 11.XML Programming

**Introduction:** Understanding Mark-up Languages, Introduction to XML and its Goals.  (3L)

**XML Basics**: XML Structure and Syntax, Document classes and Rules.  (5L)

**Other XML Concepts:** Scripting XML, XML as Data, Linking with XML.  (4L)

**XML with Style**: XSL –Style Sheet Basics,  XSL basics, XSL style sheets.  (3L)

## Books Recommended

1. William J. Pardi , XML in action web technology, Microsoft Press, 1999
2. Michael J. Young  ,Step by Step XML , Microsoft Press, 2002
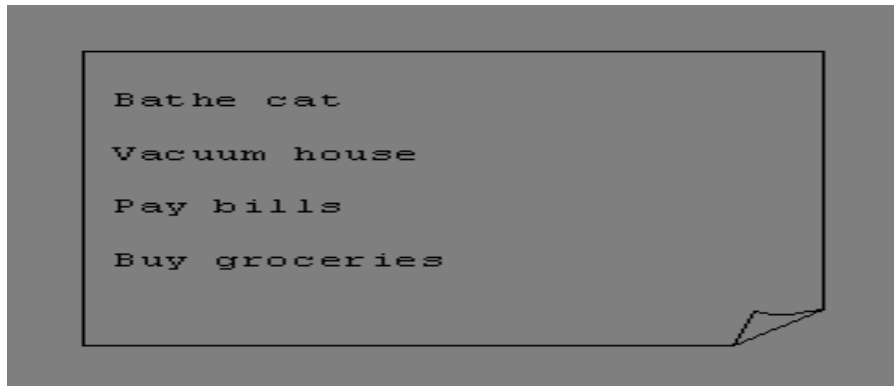
## Software Lab Based on XML:

**Exercise #1** – Information Structure
In this exercise, student will practice identifying the structure of an information object.

For the sample document provided below:

 Label the information structures you see, including containing structures.

12. Draw a tree representation of the structure.

**Exercise 2#** Deconstructing an XML Document

In this exercise, student will practice identifying the explicit structure within an XML document. In a sense, this is the reverse of what you did in Exercise #1. For the sample XML markup below, create a document-like representation (or a simple drawing) for the content contained within the XML tags:

<book>

<coverInfo>

   <title>The XML Handbook</title>

   <author>Charles F. Goldfarb</author>

   <author>Paul Prescod</author>

   <edition>Second</edition>

<description>The definitive XML resource: applications, products, and technologies. Revised and expanded—over 600 new pages.

</description>

</coverInfo>

</book>

**Exercise #3** – Creating XML Markup

In this exercise, create some XML markup based on the tree representation from Exercise #1 above, and the content from the original sample document.

**Exercise #4** – Well-Formedness
This exercise checks your understanding of the constraints for well-formedness. Are the following document instances well-formed? Explain any NO answers.

 <list><title>The first list</title><item>An item</list>

<item>An item</item><item>Another item</item>

<para>Bathing a cat is a <emph>relatively</emph> easy task as long as the cat is willing.</para>

<bibl><title>How to Bathe a Cat<author></title>Merlin Bauer<author></bibl>

**Exercise #5**-Well Formedness

This exercise is a bit more challenging than the previous example. Here is a fragment of an XML document instance. Identify all the places where it fails to match the constraints for well-formedness.

<PROCEDURE><TITLEHow to Bathe a Cat</TITLE>

<OVERVIEW>

This procedure tells you how to bathe a cat. <WARNING></OVERVIEW>Cats don't like to take baths. You could get hurt doing this. Be sure to obtain all the required protective gear before you start. </WARNING><EQUIPEMENT><ITEM>Hockey Mask <ITEM>Padded Full-body Kevlar Armor</ITEM><ITEM>Tub full of warm water</ITEM><ITEM>Towels </ITEM><ITEM>First Aid kit</ITEM><ITEM>Cat Shampoo</ITEM> <EQUIPMENT><INSTRUCTIONS> <STEP> Locate the cat, who by now is hiding under the bed.</STEP><STEP>Place the cat in the tub of water.</STEP> <ITEM>Using the First Aid kit, repair the damage to your head and arms.</STEP> <STEP>Place the cat back in the tub and hold it down.</STEP> <STEP>Wash it really fast, then make an effort to dry it with the towels.</STEP> <STEP>Decide not to do this again. </STEP> </INSTRUCTIONS>

**Note: Cover more exercises based on XML Programming theory concepts.**


## 12. R-Programming                                    (1+2 Labs)

Introduction: Overview and History of R, Getting Help, Data Types, Subsetting, Vectorized Operations, Reading and Writing Data.                                    **(5L)**

Control Structures, Functions, lapply, tapply, split, mapply, apply, Coding Standards.     **(5L)**

Scoping Rules, Debugging Tools,  Simulation, R Profiler.

Reference Book

W. N. Venables, D. M. Smith, An Introduction to R, R-core team,2015                **(5L)**

## Software Lab Based on R Programming:

1. Write a program that prints 'Hello World' to the screen.
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n
3. Write a program that prints a multiplication table for numbers up to 12.
4. Write a function that returns the largest element in a list.
5. Write a function that computes the running total of a list.
6. Write a function that tests whether a string is a palindrome.
7. Implement the following sorting algorithms: Selection sort, Insertion sort, Bubble Sort
8. Implement linear search.
9. Implement binary search.
10. Implement matrices addition , subtraction and Multiplication