

## ENG 121 English I (3 – 0 – 0)

### Evaluation

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

### Course Objectives

This course contains informative reading to improve reading skills, exercises to help improve listening skills, effective writing exercises to develop useful techniques in writing and realistic creative writing to give an opportunity to express oneself. The course aims to develop the overall skills in the use of English language. Especially it aims to:

1. Revise and consolidate on what the students have already learnt in their +2 or higher secondary course;
2. Develop and extend their knowledge further;
3. Develop their reading, listening and writing skills;
4. Orient them towards creative writing;
5. Polish student "problem areas" of English grammar;
6. Develop their vocabulary skills; and
7. Develop the knowledge and practice of functional language needed in different situations.

The method of teaching should be student-centered and activity oriented. Extensive use of audiovisuals and workbook should be made.

### Course Contents

#### 1. Module I

Desert Island, Around the world, that's show business!, Food and drink, Crossing the Channel  
16 hours

#### 2. Module II

Buildings and homes, put it in writing. The third age, It takes all sorts ....., communication  
16 hours

#### 3. Module III

The English- speaking world, Travelers, Love Stories, On business, Here is the news  
16 hours

### Text Book

Jones, Leo: Cambridge Advanced English, Cambridge: CUP

### Reference

Dictionary, Video and Cassettes

## MTH 131 Mathematics I (3 – 0 – 0)

### Evaluation

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

### Course Objectives

This course aims to provide students with an opportunity to review basic mathematical tools necessary for computer information system core courses.

### Course Contents

#### 1. Sets

6 hours

- 1.1 Introduction
- 1.2 Types of sets
- 1.3 Venn diagram
- 1.4 Number of elements in a set

#### 2. Real Numbers

7 hours

- 2.1 Types of real numbers,
- 2.2 Absolute value of real numbers,
- 2.3 Open and close intervals,
- 2.4 Linear inequality and their graph,
- 2.5 Mathematical induction

#### 3. Limits & Continuity

8 hours

- 3.1 Introduction
- 3.2 Limit of a function
- 3.3 Techniques of finding limits
- 3.4 Continuity & discontinuity
- 3.5 Demand & Profit function

#### 4. Differentiation

7 hours

- 4.1 Introduction
- 4.2 Techniques of differentiation
- 4.3 Derivative of algebraic, exponential, logarithmic & simple trigonometric functions.
- 4.4 Higher order derivative
- 4.5 Application of derivative
  - 4.5.1 Increasing & decreasing function
  - 4.5.2 Maxima & minima of function of one variable
  - 4.5.3 Concavity of the function
  - 4.5.4 Inflection point
- 4.6 Average cost & Marginal cost

- 4.6.1 Average revenue & marginal revenue
- 4.6.2 Profit maximization under perfect competition
- 4.6.3 Profit maximization under monopoly

## **5. Functions of Several Variables**

**7 hours**

- 5.1 Introduction
- 5.2 Partial derivative
- 5.3 Homogeneous function
- 5.4 Euler's theorem
- 5.5 Differentiation
- 5.6 Second & Higher order differentials
- 5.7 Implicit functions

## **6. Symbolic Logics**

**6 hours**

- 6.1 Introduction
- 6.2 Statements
- 6.3 Logical connectives
- 6.4 Conjunction, Disjunction, Negation, conditional or Implication, Bi-conditional
- 6.5 Logical equivalence
- 6.6 Negation of compound events
- 6.7 Tautology & contradiction

## **7. Asymptotes**

**7 hours**

- 7.1 Introduction
- 7.2 Determination of asymptotes of algebraic curves
- 7.3 Vertical asymptotes
  - 7.3.1 Horizontal asymptotes
  - 7.3.2 Oblique asymptotes
- 7.4 Asymptotes of Algebraic curves
- 7.5 Asymptotes of curve in polar coordinates.

### **Text Books**

1. Yamane, Taro: Mathematics for Economist, Prentice Hall of India.
2. Chaing, Alpha C.: Fundamental Methods of Mathematical Economics, McGraw Hill International.

### **Reference Book**

1. B.C. Das & B.N. Mukharjee Differential Calculus.

## **CMP 116 Computer Fundamental and Application (3 – 0 – 3)**

### **Evaluation**

	<b>Theory</b>	<b>Practical</b>	<b>Total</b>
<b>Sessional</b>	30	20	50
<b>Final</b>	50	-	50
<b>Total</b>	80	20	100

### **Course Objectives**

- 1) To know the basics of computer
- 2) To understand the basics of operating systems
- 3) To understand how to use software packages in day to day
- 4) To familiarize computer hardware and general take care
- 5) To apply communicative tools ( E-mail, Internet etc,) for common practices

### **Course Contents**

#### **1. Introduction to Computer**

**4 hours**

- 1.1 Definition
- 1.2 History of computer
- 1.3 Generation of computer
- 1.4 Types of Computer
- 1.5 Characteristics of computer
- 1.6 Application of computer

#### **2. Basic Organization of Computer**

**3 hours**

- 2.1 Basic function of computer
- 2.2 Basic functional organization of computer
  - 2.2.1 Input unit
  - 2.2.2 Output unit
  - 2.2.3 Storage unit
  - 2.2.4 Arithmetic and logic unit
  - 2.2.5 Control unit
  - 2.2.6 Central Processing Unit (CPU)
- 2.3 The system concept

#### **3. Computer Software**

**3 hours**

- 3.1 Introduction to software and hardware
- 3.2 Different between hardware and software
- 3.3 Logical system architecture
- 3.4 Types of software
- 3.5 Firmware
- 3.6 Middleware

#### **4. Accessories (devices) and Data Handling**

**8 hours**

- 4.1 The input accessories

- 4.1.1 Keyboard Devices
- 4.1.2 Point and Draw Devices
- 4.1.3 Data Scanning Devices
- 4.1.4 Digitizer
- 4.1.5 Electronic Cards Based Devices
- 4.1.6 Speech Recognition Devices
- 4.1.7 Vision Based Devices
- 4.2 The Output Accessories
- 4.3 Monitor
  - 4.3.1 Printer
  - 4.3.2 Plotter
  - 4.3.3 Computer Output Microfilm (COM)
  - 4.3.4 Screen Image Projector
  - 4.3.5 Voice Response Systems
- 4.4 Ergonomically Designed Devices
- 4.5 How to buy a computer ( Detailed Configuration)
- 4.6 Computer Network
  - 4.6.1 Definition
  - 4.6.2 Types of Computer Network (PAN, LAN, CAN, MAN and WAN)
  - 4.6.3 Network Topologies
  - 4.6.4 Internet and E-mail

## **5.Mastering DOS, Windows**

**8 hours**

- 5.1 Introduction
- 5.2 Functions of OS
- 5.3 Types of OS
- 5.4 Different between GUI and TUI/CUI
- 5.5 Booting System and its types (Warm and Cold Booting)
- 5.6 The DOS (involves different commonly used command)
- 5.7 Windows operating system, settings, properties and installation guides
- 5.8 Software Tools and application (Disk Defragmentation, Scan Disk, System Restore, Partition etc.)

## **6.Computer Hardware**

**15 hours**

- 6.1 Different Components of Computer
- 6.2 Power supply
  - 6.2.1 Types of power supply, Ratings
  - 6.2.2 Concepts of SMPS, UPS
- 6.3 Motherboard
  - 6.3.1 Components of Motherboard
  - 6.3.2 System Chipset,
  - 6.3.3 System based, System BIOS,
  - 6.3.4 Processor and types
- 6.4 Storage Devices:
  - 6.4.1 Primary Memory and Secondary Memory
  - 6.4.2 Types of primary and Secondary Memory

## **7.System Care Guide**

**10 hours**

- 7.1 Maintenance
- 7.2 Types of Maintenance
  - 7.2.1 Preventive Maintenance ( Various Kinds of Preventive Maintenance)
  - 7.2.2 Corrective Maintenance
- 7.3 System Care
  - 7.3.1 System Care Factor (General System Care Factors, environmental care factors, cooling and ventilation care factors, Power Care Factors, Data loss and virus prevention factors, data problem prevention factors)
- 7.4 Backups and Disaster recovery
  - 7.4.1 Back up methods,
- 7.5 Devices and Media

## **Laboratory**

1. Use of windows environment
2. Office Automation ( Ms-word, Ms Excel, Ms- Power Point)
3. Assembling and Disassembling of Computer
4. Email, Internet

## **Reference Books**

1. B. Ram: Computer fundamentals, New Age international (P) Ltd.
2. Foundations of Computing, BPB Publication ( Third Edition)
3. Gini Courter & Annette Marquis: Microsoft Office 2007/2010, BPB Publications
4. Allan Simpons & Elizabeth Olson: Easy Guide to windows 2007, BPB Publications

## **CMP 117 Programming Logic and Technique (3 – 0 – 0)**

### **Evaluation**

	<b>Theory</b>	<b>Practical</b>	<b>Total</b>
<b>Sessional</b>	50	-	50
<b>Final</b>	50	-	50
<b>Total</b>	80	-	100

### **Course objectives**

This course is designed to acquaint the student with the concept of fundamental problem analysis, modeling and coding techniques.

### **Course Contents**

#### **1. Programming Languages**

**11 hours**

- 1.1 Introduction
- 1.2 Analogy with Natural Language
- 1.3 Classification of computer Language ( Low Level Language and High Level Language)
  - 1.3.1 Low Level Languages, (Machine and Assembly Language)
  - 1.3.2 Advantages and Disadvantages of Machine Level Language
  - 1.3.3 Advantages of Assembly Language over machine Level Language
  - 1.3.4 Disadvantages of Assembly Language
- 1.4 High Level Language
  - 1.4.1 Advantages and Limitations of High Level Language
  - 1.4.2 Difference between Low Level and High Level Language
  - 1.4.3 Program Language Translator
    - 1.4.3.1 Types of Translator (Compiler, Assembler and Interpreter)
    - 1.4.3.2 Different among Translator
- 1.5 Linker and Loader
  - 1.5.1 Types of Linker and Loader
- 1.6 Generation of Computer Languages
  - 1.6.1 3GL and 4GL
  - 1.6.2 Advantages of 4GL over 3GL
  - 1.6.3 Feature of 4GL ( Object Oriented Language)
- 1.7 Machines Independent and Portability of programs
- 1.8 Some Important types of High Level Language

#### **2. Software Development (Program Development)**

**10 hours**

- 2.1 Introduction to program development/software development
- 2.2 Program Development Life cycle.
  - 2.2.1 Problem identification
  - 2.2.2 Problem Analysis/Requirement Analysis
  - 2.2.3 Program Design: Phases of program Design ( Data design, Input, output, procedure, file design)
  - 2.2.4 Program coding
  - 2.2.5 Program Testing and Debugging
  - 2.2.6 Program Delivery/ Implementation and Evaluation
  - 2.2.7 Program Maintenance

- 2.2.8 Documentation
- 2.3 Programming Tools
  - 2.3.1 Algorithm
  - 2.3.2 Flowchart
  - 2.3.3 Decision Table
  - 2.3.4 Pseudocode
- 2.4 Comparison of them
- 2.5 Advantages and Disadvantage of Them
- 2.6 Symbols and some examples

### **3. Programming Technique**

**9 hours**

- 3.1 Introduction
- 3.2 Type of Programming Technique (Approaches)
  - 3.2.1 Modular, Top down, bottom up, Structure and Object Oriented approach
  - 3.2.1 Advantages and Disadvantages
- 4.3 Program Development Methods (Models)
  - 4.3.1 Types of Program Development Models (Water fall or Traditional model, Prototype or Transformation model, Spiral model, Iterative Model, V-model, RAD model, Bog Bang Model, Evolutionary Models)
  - 4.3.2 Advantages and Disadvantages of Waterfall, Prototype and Spiral Model ( Simple Introduction to other Models)
- 4.4 Cohesion and coupling
  - 4.4.1 Types of Cohesion and Coupling
  - 4.4.2 Use of cohesion and Coupling in Program Development
- 4.5 Logics of Program development
  - 4.5.1 Types of Logics ( Sequential, Selection Iteration and Recursion)
  - 4.5.2 Differentiation
- 3.6 Communication between modules

### **4. Program Maintenance**

**9 hours**

- 4.1 Introduction
- 4.2 Types of Program maintenance (Corrective maintenance, Adoptive maintenance, Perfective maintenance, Emergency maintenance)
- 4.3 Problem Areas in Program Maintenance
- 4.2 Cost issues in software maintenance
- 4.3 Impact of software Errors
- 4.3 Program documentation and its standards
  - 4.3.1 Requirements of Documentation
  - 4.3.2 Importance of Documentation
  - 4.3.3 Types of Documentation
- 4.4 Program Specification
- 4.5 System Flow chart
  - 4.5.1 Elements of System Flowcharts
  - 4.5.2 Examples
- 4.6 Data Flow Diagram
  - 4.6.1 Element of DFD



- 4.6.2 Leveling the data flow diagram
- 4.6.3 Idea for Drawing DFD
- 4.6.4 Examples

## **5. Standalone and Client Server Programming Concept**

**9 hours**

- 5.1 Introduction to standalone Programming concept
  - 5.1.1 Advantages and limitations of Standalone Programming
- 5.2 Introduction to Client Server Programming (CSP)
  - 5.2.1 Advantages and Disadvantages of CSP
  - 5.2.2 Distinguish between Standalone and Client Server Programming
  - 5.2.3 Client Server Programming Architecture
- 5.5 Introduction to Web-based Programming
  - 5.5.1. Advantages and Disadvantages of web-based programs
  - 5.5.2 Architecture of Web-based Programming
  - 5.5.2 Web-based System and Programming
- 5.6 Introduction to a few web based languages and their capabilities
- 5.7 Requirement of Platform-Independents system

### **Reference Books**

1. V.K. Jain: Computer Fundamentals, BPB Publication
2. Foundations of Computing, BPB Publication (Third Edition)

## ELX 111 Digital Logic Systems (3 – 1 – 2)

### Evaluation

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

### Course Objectives

This course aims to develop methods of designing, constructing and building logic circuits and also to introduce the operation and application of microprocessor. Topics will include basic gates, number system, flip-flops, decoder, encoder and ALU.

### Course Contents

#### 1. Number System

6 hours

- 1.1 Introduction to number systems (Decimal, Binary, Octal and Hexadecimal)
- 1.2 Conversions
- 1.3 Complements, subtraction using 1's complement, 2's complement, 9's complement and 10's complement
- 1.4 Application of the complements (1's and 2's)
- 1.4 BCD code, Error detection codes, Alphanumeric codes, Excess -3 code, Gray code

#### 2. Boolean Algebra and Logic Gates

6 hours

- 2.1 Introduction to Digital system
- 2.2 Basic theorem and properties of Boolean Algebra (identity law, boundedness law, idempotent law, complement law, Commutative law, Distributive law, absorption law, associative law, de-Morgan's law and involution law)
- 2.3 Boolean functions, complement of Boolean function
- 2.4 Digital logic gates and truth tables (AND, OR, NOT, NAND, NOR, XOR, XNOR)
- 2.5 Canonical and standard forms
  - Minterms and maxterms, sum of minterms, product of maxterms

#### 2. Simplification of Boolean Functions

6 hours

- 2.1 The Karnaugh map- 2, 3 and 4 variables
- 2.2 Simplification and realization by using NAND and NOR gates
- 2.3 Practical design steps

#### 3. Combinational Logic with MSI and LSI

8 hours

- 3.1 Introduction
- 3.2 Design procedures
- 3.3 Half and full adders, Subtractors
- 3.4 Code conversion (BCD to excess-3, 8,4,-2,-1 code to BCD, 2,4,2,1 code to 8,4,-2,-1 code)
- 3.5 Decoder, Encoder, Multiplexers and Demultiplexers, BCD to seven segment decoder
- 3.6 ROM and its implementation, PLA

## **5. Sequential Logic**

**10 hours**

- 5.1 Introduction
- 5.2 Flip-Flops: RS flip flop, D-flip flop, J-K flip flop, T flip flop
- 5.3 Triggering of flip flops (Positive, negative and level trigger)
- 5.4 Master –Slave flip -flop
- 5.5 Analysis of clocked sequential Circuits with example, state table, state diagram, state Equation, flip-flop input functions
- 5.6 State reduction and assignment
- 5.7 Flip-Flops excitation Tables and design procedures.

## **6. Registers and Counters**

**6 hours**

- 6.1 Introduction
- 6.2 Shift Registers (Serial in Serial Out, Serial in Parallel Out, Parallel in parallel out, parallel in Serial Out)
- 6.3 Ripple counters (binary ripple counter, BCD ripple counter)
- 6.4 Synchronous Up/Down Counters
- 6.5 Timing Sequences

## **7. Processor Logic Design**

**6 hours**

- 7.1 Introduction
- 7.2 Processor Organization
  - Bus organization, scratchpad memory, Accumulator Register
- 7.3 Arithmetic Logic Unit (ALU)
  - Design of arithmetic circuit, design of logic circuit

## **Laboratory**

1. Verification of basic gates function: OR, AND, NAND, NOR, EX-Or, EX\_NOR)
2. Multiplexers and demultiplexers (using the Principle learned in K-Map).
3. Encoders and decoders (using the principle learned in K-Map)
4. Adder and subtractions, in these laboratory students will construct a full adder and subtractor using basic design principle.
5. RS, D-Type, clocked D and master slave. In this laboratory students will design and verify the concepts of different flip-flops based on basic logic gates.
6. Design of counters (decade counters and binary counters). Students will design decade and binary counters verify the concepts using the CAD tools.
7. Design of shift registers (serial in serial out and parallel in parallel out)

## **Text Books**

1. Malvino: Digital Computer Electronics
2. Morris Mano: Digital Logic and Computer Design
3. Frederic J. Mowle: A systematic approach to digital logic design

## **ELX 112 Fundamentals of Electrical and Electronics (3 – 0 – 3)**

### **Evaluation**

	<b>Theory</b>	<b>Practical</b>	<b>Total</b>
<b>Sessional</b>	30	20	50
<b>Final</b>	50	-	50
<b>Total</b>	80	20	100

### **Course Objectives**

After completion of this course students will be able to:

1. Analyze electric circuits
2. Gain familiarity with semiconductor devices
3. Introduction of semiconductor logic

### **Course Contents**

#### **1. Electric Circuit Elements**

**2 hours**

- 1.1 Resistors
- 1.2 Inductors
- 1.3 Capacitors
- 1.4 Voltage and Current Sources

#### **2. DC Circuits**

**7 hours**

- 2.1 Ohm's Law
- 2.2 Series and parallel circuits
- 2.3 Power and energy
- 2.4 Kirchhoffs voltage and current laws
- 2.5 Loop and nodal equations
- 2.6 Maximum power transfer theorem
- 2.7 Thevenin's and Norton's equivalent circuits

#### **3. Single-Phase AC circuits**

**7 hours**

- 3.1 Sinusoidal waveform
- 3.2 Resistors, inductors and capacitors with sinusoidal excitation
- 3.3 Phasor representation of AC quantities
- 3.4 Concept of complex impedance and admittance
- 3.5 Average and effective values of voltages and currents
- 3.6 Power in AC: instantaneous power, average power, real power, apparent power, power factor

#### **4. Semi-conducting Materials**

**5 hours**

- 4.1 Energy band structures of conductors, insulators and semiconductors, Fermi level and energy gap.
- 4.2 Conduction principle in semiconductors, electrons and holes.
- 4.3 Donor and acceptor impurities n-and p-type semiconductors

#### **5. The P-n Junction diode**

**7 hours**

- 5.1 Formation of space-charge region in p-n junction
- 5.2 Energy band structure and barrier potential

- 5.3 The p-n junction under forward bias and reverse bias
- 5.4 Characteristic curve, diode load line.
- 5.5 Application of diode(logic gates: AND, OR, NOT and rectifiers: half and full wave )
- 5.6 Zener diode, characteristics and applications

## **6. Bipolar Junction Transistor**

**7 hours**

- 6.1 Transistor types: pnp and npn transistors, principle of operation, and parameter and their relationships.
- 6.2 Transistor configurations: common base, common emitter and common collector, amplification, input and output impedances
- 6.3 Biasing, Dc and Ac load lines, operating point
- 6.4 Application of BJT (Resistor Transistor logic gates: AND, OR)

## **7. Junction Field-Effect Transistor**

**4 hours**

- 7.1 Construction, types and principle of operation
- 7.2 JEET quadratic characteristics
- 7.3 Biasing and load line

## **8. Metal Oxide Semiconductor Field Effect Transistor**

**4 hours**

- 8. 1 Construction, n-MOS and p-MOS, principle of operation
- 8.2 Depletion and Enhancement type MOSFETs, quadratic characteristics

## **9. The Operational Amplifier**

**5 hours**

- 9.1 The ideal operational amplifier and its characteristics
- 9.2 Inverting and non-inverting amplifiers
- 9.3 Summing amplifier
- 9.4 Integrating and differentiating amplifiers

## **Laboratory**

1. Verification of Kirchhoffs voltage and current laws
2. Verification of maximum power transfer theorem
3. Measurement of active, reactive and apparent powers in a single-phase ac circuit
4. Characteristics of different diodes: silicon diode, germanium diode, zener diode
5. To verify Logic gates using diodes and resistors.
6. To rectify ac signals using one and two diodes.
7. Input and output characteristics of a common –emitter transistor
8. Output and transfer characteristics of a common-source JFET
9. Output and transfer characteristic of a common-source MOSFET
10. Inverting and non-inverting operational amplifier circuits

## **Reference Books**

1. Sedra and Smith: Microelectronic Circuits
2. Shaum Series: Electronic Circuit
3. BL Thereja: A Textbook of Electrical Technology Vol- I
4. J. B. Gupta: Electronic Device and Circuits

## **CMP 118 Programming Languages (3 – 0 – 3)**

### **Evaluation**

	<b>Theory</b>	<b>Practical</b>	<b>Total</b>
<b>Sessional</b>	30	20	50
<b>Final</b>	50	-	50
<b>Total</b>	80	20	100

### **Course Objectives**

1. To develop various problem solving strategies.
2. Implementing various programming technique using C.
3. To make foundation in programming languages.

### **Course Contents**

#### **1. Introduction**

**3 hours**

- 1.1 Flow chart and algorithms
- 1.2 History of C
- 1.3 Characteristics of C
- 1.4 Structure of C Program

#### **2. Variable and data types**

**7 hours**

- 2.1 Constant and variables
- 2.2 Variable declaration
- 2.3 Variable Types
- 2.4 Simple input/output function
- 2.5 Operators

#### **3. Loops and Decisions**

**8 hours**

- 3.1 Introduction
- 3.2 For Loop,
- 3.3 While Loop
- 3.4 Do while Loop
- 3.5 Nested Loop
- 3.6 Case, break and continue statements
- 3.7 The if, if else, else-if and switch statements

#### **4. Functions**

**6 hours**

- 4.1 Introduction
- 4.2 Returning a value from a function
- 4.3 Sending a value to a function
- 4.4 Arguments
- 4.5 External variables
- 4.6 Preprocessor directives
- 4.7 C libraries
- 4.8 Macros
- 4.9 Header files and prototyping

## **5. Arrays and Strings** **10 hours**

- 5.1 Introduction to Arrays
- 5.2 Initializing Arrays
- 5.3 Multidimensional Arrays
- 5.4 String
- 5.5 Functions related to the strings

## **6. Pointers** **4 hours**

- 6.1 Pointers definition
- 6.2 Pointers and Arrays
- 6.3 Returning multiple values from functions using pointers
- 6.4 Pointer Arithmetic
- 6.5 Pointer and Strings
- 6.6 Double Indirection
- 6.7 Pointer to Arrays

## **7. Structure and Unions** **4 hours**

- 7.1 Definition of Structure
- 7.2 Nested type Structure
- 7.3 Arrays of Structure
- 7.4 Structure and Pointers
- 7.5 Linked Lists
- 7.6 Union and application of it.

## **8. File I/O** **4 hours**

- 8.1 Stream
  - 8.1.1 Text Stream
  - 8.1.2. Binary Stream
- 8.2 File Pointer
  - 8.2.1 Open File
  - 8.2.2 File Open Mode
  - 8.2.3 Closing File
- 8.3 fgets, fputs
- 8.4 fread, fwrite
- 8.5 Random Access I/O (fseek)
- 8.6 fprintf/fscanf

## **9. Developing a Project** **2 hours**

- 9.1 Project definition and functional specifications
- 9.2 Top Down Analysis
- 9.3 Decomposition of Projects in different modules and inter-module relationship
- 9.4 Data flow diagrams
- 9.5 Translation of Different modules in codes

## **Laboratory**

Laboratory work at an initial stage will emphasize on the verification of programming concepts learned in class and uses of loops, functions pointers structures and unions. Final project of 10 hours will be assigned to the students to put together most of the programming concepts development in earlier exercises.

**Reference Books**

1. S.k. Srivastava and Deepali Srivastava: C in Depth
2. Kely and Pohl: A book on C
3. Wait, Mitchell, Steven Prata and Donald Martin: C primer Plus
4. Yeswant Kanetkar: Let us C



## ACC 131 Financial Accounting-I (3 – 0 – 0)

### Evaluation

	Theory	Practical	Total
<b>Sessional</b>	50	-	50
<b>Final</b>	50	-	50
<b>Total</b>	100	-	100

### Course Objectives

1. It provides the basic concepts in financial accounting.
2. It gives the knowledge to prepare financial statements.
3. It helps to collect various information system.

### Course Contents

#### 1. Introduction

**4 hours**

Concept of accounting, forms of business organization and nature of business activity; users of accounting information and their needs; fields of accounting; financial statements: the tools for communication; generally accepted accounting principles; qualitative characteristic of accounting information; objectives of financial statements; the accounting profession.

#### 2. Recording, Handling and Summarizing the Accounting Information

**9 hours**

Role of source documents, Recording of transaction and events, the accounting equation; the double entry system; analysis of transaction; rules of debits and credits for assets, expenses, liabilities, capital and income; cash accrual and hybrid system of accounting; journal-general and special including cash and bank books; role of vouchers, T-accounts; trial balance; concepts of the annual report and financial statements.

#### 3. Income Statement

**4 hours**

Concepts of income statement; major components of income statements: revenues, cost of sales, gross margin, administrative expenses, selling and distribution expenses, gains and losses, net income and retained earnings; formats of income statements; retained earning statements, preparation of income statement (Vertical multi-step format)

#### 4. Balance Sheet

**4 hours**

Concepts of balance sheet; major components of balance sheet: assets, liabilities and stockholder's equity; preparation of balances sheet (vertical, classified format)

#### 5. Work Sheet

**8 hours**

Accrual and adjusting entries; T-accounts, opening and closing entries; preparation of income statement and Balance sheet with adjustments using a work sheet.

#### 6. Statement of Cash Flows

**8 hours**

Cash flows and accrual accounting; purpose of the statement of cash flows; operating, investing and financing activities; formats of statement of cash flows; preparation of cash flow statement (vertical format)

#### 7. Annual Repot

**2 hours**

Meaning and components of an annual report

### **8. Accounting Information System and the Use of Computers in Accounting 9 hours**

Accounting information system in modern business organizations; role of computers in accounting; recording transactions, extracting ledger, trial balance and presenting the financial statements received from the accounting package; using computerized accounting software; retrieving various reports from the system

#### **Text Book**

Porter, Gary A. Norton, Curtis L., Financial Accounting: The Impact on Decision Makers, The Dryden Press, USA.

#### **Reference Books**

1. R. Narayanswamy, Financial Accounting: A Managerial Perspective, Prentice Hall of India.
2. Accounting Package
3. Sharma, Narendra, Acharya, C: Financial Accounting, Budha Academic Centre
4. Koirala, Goet, Bhandari, Sharma, Adhikari, Neupane, Upreti : Financial Accountancy I, Asmita Publication

## MTH 132 Mathematics II (3 – 0 – 0)

### Evaluation

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

### Course Objectives

1. It provides the basic mathematical idea to develop various computer information systems.
2. It gives various mathematical tools for the computer system.

### Course Contents

1. **Fundamental integrals** **12 hours**
  - 1.1 Introduction
  - 1.2 Indefinite integrals
  - 1.3 Techniques of Integration
    - 1.3.1 Integration by substitution
    - 1.3.2 Integration by parts
    - 1.3.3 Integration by partial fractions
  - 1.4 Definite Integrals
  - 1.5 Improper integrals
  - 1.6 Beta & Gamma function.
  - 1.7 Double integral (Concept only)
2. **Application of integration** **7 hours**
  - 2.1 Introduction
  - 2.2 Rectification
  - 2.3 Quadrature
    - 2.3.1 Area under a curve
    - 2.3.2 Area between the curves
    - 2.3.3 Numerical Integration
    - 2.3.4 Rectangular rule
    - 2.3.5 Trapezoidal rule
    - 2.3.6 Simpson's rule
  - 2.4 Volume
  - 2.5 Surface Area.
  - 2.6 Consumer's surplus & Producer's surplus
3. **Vector Space** **5 hours**
  - 3.1 Introduction
  - 3.2 Vector space and subspaces with examples
  - 3.3 Linear combination of vectors
  - 3.4 Linear Dependence and independence of vectors
  - 3.5 Basis and dimension of vector space

**4. Function of complex variables.****8 hours**

- 4.1 Introduction.
- 4.2 Complex variable, function of complex variables
- 4.3 Analytic function
- 4.4 Necessary & sufficient conditions for  $f(z)$  to be analytic (without proof)
- 4.5 Harmonic function
- 4.6 Conformal mappings

**5. Fourier series and Integrals****11 hours**

- 5.1 Introduction
- 5.2 Periodic function and trigonometric series
- 5.3 Fourier series
- 5.4 Fourier sine and cosine series
- 5.5 Fourier series in complex form
- 5.6 Fourier integral
- 5.7 Fourier Sine and Cosine integrals
- 5.8 Fourier Sine and Cosine transforms.

**6. Taylor series****5 hours**

- 6.1 Introduction
- 6.2 Geometric series.
- 6.3 Convergence of the geometric series.
- 6.4 Taylor series.
- 6.5 Taylor series of a function of one or two variables

**Text Books**

1. Advance Engineering Mathematics , By Erwin Kreyszig, 8<sup>th</sup> edition .
2. Calculus and Analytical Geometry, By Thomas and Finney

**Reference Books**

1. Applied Mathematics: R . K. Thukurathi and Dr. K.K Shrestha
2. Engineering Mathematics IV: Tora Narayan Paudel, Sukunda Pustak Bhawan, Kathmandu Nepal.
3. Differential Equation: Agnew R. P.; New York, MC Graw Hill Book Company 1960
4. Introduction to Mathematical Physics: Charlie Happer; prentice Hall of India Pvt. Ltd.
5. Text Book on Algebra & Theory of Equations: Chandrika Prasad; Pothishala Pvt. Ltd.

## **ENG 122 Business and Technical Communication (3 – 0 – 0)**

### **Evaluation**

	<b>Theory</b>	<b>Practical</b>	<b>Total</b>
<b>Sessional</b>	50	-	50
<b>Final</b>	50	-	50
<b>Total</b>	100	-	100

### **Course Objectives**

The main objectives of this course are:

1. To develop the ability to deliver technical knowledge orally in English.
2. To be able to comprehend and take notes after listening and reading.
3. To fasten reading skills in technical and non-technical reading materials.
4. To develop summarizing skills in writings.
5. To impart the knowledge of effective written and oral communication skills for handling business operations.

### **Course Contents**

#### **1. Review of English Grammar**

**6 hours**

Clause and its types; Sentence structure, sentence types (simple, compound and complex); transformation of sentences; Voice (Active and Passive); Variety levels of English: formal, informal, polite, familiar, impolite, spoken and written

#### **2. Fundamentals of Business Writing**

**3 hours**

Adaptation and Selection of Words (Importance of Adaptation, suggestions for selecting words and suggestions for non- discriminatory writing), Construction of clear sentences and paragraphs

#### **3. Business Correspondence**

**9 hours**

Situations requiring directness (Direct inquiries, Favorable Responses, Adjustments grants, Order acknowledgements, Claims, Personal evaluation, Order letters); Indirect Situations: (Refused request, Adjustment and refusals, Credit refusals, Vague and back order); Persuasive Request and Collections: (Persuasive Requests, Collection letters)

#### **4. Technical Writing Skills**

**12 hours**

Preparation of short memoranda (Importance- formats); Job Application and Bio-data; Description writing (Process, Mechanism, and Place etc.); Seminars papers (Conduction of seminar, Writing Seminar Paper, Preparation of circular), Preparation of reports (Types: short, long letter, memo-reports); Writing Proposals (Grant, Research, Project Proposals); Conduct of Meeting (Agenda, Notification, Minute Preparation); Documentation (APA Format : Citing Author/s, Book/s, Journal, Newspaper, Magazine and Websites)

#### **5. Oral Communication**

**6 hours**

Technical talks (Suggested Topics: Environmental pollution, construction, water resources, impact of computer in modern society, impact of satellite communication, urban development); Interview (Effective Techniques, How to prepare, Body Language, What to expect? Dos and Don'ts)

**6. Technology Enabled Communication****3 hours**

(Using technology in communication task, Tools for presenting messages, Tools for transmitting messages, Tools for collaboration, A look to the future)

**7. Reading skills****6 hours**

Comprehension question and exercise (from prescribed passages- Freedom (G. B. Shaw), Knowledge and Wisdom (Bertrand Russel), The Story of an Hour (Kate Chopin), Why Go to University? (Moti Nissani), Beauty (Susan Sontag); Note Taking and Summary/ Precis Writing (from any passages containing 250-350 words)

**8. Practical Works****3 hours**

- i. To present a seminar paper,
- ii. To participate in a group discussion,
- iii. To conduct a meeting
- iv. To prepare and practice to face an interview

**Text Books**

1. Andrea J, Rutherford. *Basic Communication Skills for Technology*. 2<sup>nd</sup> Edition. Pearson Education Asia (LPE)
2. Lesikar, Raymond V. & et-al: *Business Communication*, TATA McGraw Hill Education Pvt. Ltd.

**Reference Books**

1. Anne Eisenberg, *Effective Technical Communication*, Mc- Graw Hill 1982
2. Houp and T. E. Pearsall, *Reporting Technical Information*, Allyn and Bacon, Boston.
3. V. R. Narayanaswami, *Strengthen your Writing*, Orient Longman, Madras.
4. Champa Tickoo and Jaya Sasikumar, *Writing with a Purpose* Oxford University Press, Bombay.
5. Khanal, Arjun. *Communication Skills in English*, Sukunda Pustak Bhawan, Kathmandu 2010

## PRJ 151 Project I (0 – 0 – 1)

### Evaluation

	Theory	Practical	Total
<b>Sessional</b>	-	50	50
<b>Final</b>	-	50	50
<b>Total</b>	-	100	100

### Course Objectives

1. To develop the ideas about the programming concept using PLT.
2. Implementing various programming technique using C.
3. To develop the small project about any real based system using programming language C.

### Course Contents

The following are documentation guidelines to be given to each student along with an assignment that should cover most of the main topics given in the framework.

- Cover Page
  - Executive summary
  - Acknowledgment
1. Introduction
  2. The Assignment project
  3. Objective of Assignment project
  4. Time Plan for the work assigned
  5. Investigation of the problems
  6. System Analysis
    - 6.1 Feasibility study
    - 6.2 Context Diagram
    - 6.3 Data Flow Diagram
  7. System Design
    - 7.1 ER and implementation
    - 7.2 User interface
  8. Program Specification
  9. Algorithms
  10. Flowchart or Decision tree or Decision Table or Structure English
  11. Program coding
  12. Input test Data
  13. Program Testing
  14. Output/Reports
  15. Computer (software and Hardware) requirement to run this program
  16. Software Installation and operation procedures
  17. Comments on the Assignment project if any (How did he/she find it? Time provided and resources along with teacher's guidance at required of the student or not. What improvement you would make if certain asked thing provided to you?)
  18. Conclusion and recommendation
  19. Users Manual

**Special attention**

Each student should be given ample opportunity to use computer system for the assigned project work. Sample format of project work could be given to the students before assigning the work.

The computer system must have required necessary software packages and program installed in order to accomplish the tasks assigned to them. Teacher could guide students during the development work assign to students. **Generally, individual project is more preferable** because he/she can learn more on project but project work can be done in group (maximum of 5 persons in each group).



## **CMP 224.3 Data Structure and Algorithm (3-0-1)**

### **Evaluation:**

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	100	-	100

### **Course Objectives:**

This course aims to provide fundamental knowledge on data structure designing and implementation for storing information, and various algorithms used in computer sciences.

### **Course Contents:**

#### **1. Introduction**

**3 hours**

Introduction of DSA, Abstract Data Types (ADTs), its scope, data structure and its types, brief introduction to Recursion

#### **2. Algorithms Analysis**

**2 hours**

Introduction, Complexity analysis, asymptotic analysis

#### **3. Lists, Stacks and Queues**

**6 hours**

The list ADT (linear, linked list), insertion and deletion operation in list, The stack ADT (linear and linked), PUSH and POP operation on stack, exception case. The queue ADT (linear, linked and Circular), enqueue and dequeue operation on queue.

#### **4. Trees**

**6 hours**

Preliminaries, Binary trees, The search tree ADT- Binary search trees, AVL trees, Splay trees, Tree traversals, B-trees

#### **5. Hashing**

**6 hours**

General idea, hash function, load factor Open hashing (separate chaining), Closed hashing (Open addressing), Rehashing, Extendable hashing

#### **6. Priority Queues**

**6 hours**

Simple implementation, Binary heap, Applications of priority queues, D-heaps, Leftist heaps, skew heaps, Binomial queues

#### **7. Sorting**

**7 hours**

Preliminaries, Insertion sort, A lower bound for simple sorting algorithms, Shell-sort, Heap-sort, Merge-sort, Quick-sort, Sorting large objects, A general lower bound for sorting, Bucket sort, External sorting

#### **8. Graph Algorithm**

**6 hours**

Definitions, Topological sort, Shortest-path algorithm, Network flow problems, Minimum Spanning tree Applications of Depth-first search

## **9. Algorithm Design Techniques**

**6 hours**

Greedy algorithm, Divide and conquer, Dynamic programming, Randomized algorithms, Backtracking algorithms

### **Laboratory**

There shall be 10 lab exercises based on C or C++

1. Implementation of stack
2. Implementation of linear and circular queue
3. Solution of TOH and Fibonacci recursion
4. Implementation of Link list: Singly, and doubly linked
5. Implementation of tree: AVL tree, Balancing of AVL
6. Implementation of merge sort
7. Implementation of search: sequential, Tree and Binary
8. Implementation of Graphs: Graph traversals
9. Implementation of hashing
10. Implementation of heap

### **Text Book:**

Langsam, Y., Augustin, M.J. and Tanenbaum, A.M: Data Structure Using C and C++, Prentice Hall of India

### **Reference Books:**

1. Rowe, G.W.: Introduction to Data Structure and Algorithms with C and C++, Prentice Hall of India
2. Mark, Allen, Weiss: Data structure and Algorithm Analysis in C++

## ACC 102.3 Financial Accounting II (3-0-1)

### Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

### Course Objectives:

This course aims to equip students with the knowledge and skill in handling financial accounting system. Specifically it aims to acquaint students with the

- Recording, accounting, valuation and disclosure in the financial statements of the inventories and the cost of goods sold;
- Accounting and disclosure of cash equivalents and receivables;
- Accounting and disclosure of non-current assets and liabilities;
- Accounting and disclosure of current liabilities; and
- Accounting and presentation of owner's equity and dividends.

### Course Contents:

#### 1. Accounting for Inventories and cost of Goods Sold **8 hours**

The nature of inventory; cost of goods sold model; inventory valuation and income measurement; inventory costing methods; choice of a method; methods of inventory estimation; effect of inventory valuation method on the cost of goods sold; disclosure in the financial statements

#### 2. Accounting for cash, Cash Equivalent and receivables **8 hours**

Cash and cash equivalent: components of cash and cash equivalents; Preparation of the bank reconciliation statement and the need for adjustments to accounting records; petty cash, balance sheet presentation cash and cash equivalent. Accounts receivable: valuation of accounts receivables, methods to account for uncollectible amount, balance sheet presentation; notes receivable: interest bearing notes, non-interest bearing notes, presentation of the notes receivable and related aspects in the financial statements

#### 3. Accounting for Non-current Assets **11 hours**

Concepts of capital, revenue and deferred revenue expenditure; types of operating assets; acquisition of operating assets and the capitalization process; depreciation: concepts, methods, and accounting (straight line and diminishing balance method including accelerated depreciation method), disposal of assets and accounting for gains and losses; disclosure in the financial statements

#### 4. Accounting for Current Liabilities **5 hours**

Accounts payable; notes payable, tax payable, warranties and accrued liabilities; balance sheet presentation

#### 5. Accounting for Non-current Liabilities **9 hours**

Bonds payable: issuance of bonds, characteristics of bonds, factors affecting bond price, premium of discount on issuance of bonds, bond amortization, redemption of bonds, disclosure in financial statements. Accounting for lease; Operating and financial lease; balance sheet of presentation.

**6. Accounting for Stockholders' Equity and Dividends**

**7 hours**

Stockholders' Equity: components of the stockholders' equity section of the balance sheet; Stocks; type of stock, issuance of stock, stock issued for cash and non-cash consideration and on a subscription basis, treasury stock, retirement of a stock; presentation in the financial statements; Dividends; Meaning and types of dividend-cash dividend, cash dividend for ordinary stock and preferred stock; stock dividend and stock split, disclosure in financial statements

**Text Book:**

Porter; Gray A. and Norton, Curtis L, Financial Accounting: The Impact on Decision Makers, The Dryden Press, USA.

**Reference Books:**

1. Narayanswamy, R., Financial Accounting: A Managerial Perspective, Prentice Hall of India. New Delhi.
2. Sanjib Neupane, Dharma Raj Upreti, Financial Accounting II Asmita Publication

## ELX 232.3 Microprocessor (3-1-1)

### Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	100	-	100

### Course Objectives:

1. This course will provide the fundamental knowledge to understand the basics, operation.
2. It also provides the basic idea of assembly level programming and application of microprocessor.

### Course Contents:

#### 1. Introduction

**3 hours**

- 1.1. Introduction to Microprocessors
- 1.2. Review of Processor Bus Organization, Arithmetic Logic Unit (ALU)

#### 2. Basic Computer Architecture

**12 hours**

##### 2.1 SAP-1 Architecture

- \* 8-bit "W" bus
- \* 4 – bit program counter only counts up (starts execution at 0)
- \* 4 – bit memory Address register (MAR)
- \* 16x8- bit memory
- \* 8-bit instruction register (IR)
- \* 6-cycle controller with 12-bit micro-instruction word
- \* 8-bit accumulator
- \* 8-bit B register
- \* 8-bit adder-subtractor
- \* 8-bit output register

##### 2.2 SAP-1 Instructions

##### 2.3 Fetch & Execution, Micro program

- Fetch Cycle
- Execution cycle
- microprogram
- Controller implementation

#### 3 SAP 2

**3hours**

##### 3.1 SAP 2 Architecture

##### 3.2 Architectural differences with SAP-1

##### 3.3 bi-directional registers

##### 3.4 instruction set

##### 3.5 flags

#### 4 Instruction Cycle

**3 hours**

##### 4.1 Fetch Operation and Timing Diagram

- 4.2 Execute Operation and timing Diagram
- 4.3 Machine Cycle and States

## **5 Intel 8085**

**9 hours**

- 5.1 Functional Block Diagram and Pin configuration
- 5.2 Timing and Control Unit
- 5.3 Registers
- 5.4 Data and Address Bus
- 5.5 Inter 8085 instructions
- 5.6 Operation Code and Operands
- 5.7 Addressing Modes, Interrupts, Flags
- 5.8 Instructions and Data Flow inside 8085
- 5.9 Basic Assembly Language Programming Using 8085 Instruction Sets

## **6 Basic I/O And Memory R/W Operations**

**4 hours**

- 6.1 Memory Read
- 6.2 Memory Write
- 6.3 I/O Read
- 6.4 I/O Write
- 6.5 Introduction to Direct Memory Access

## **7 Digital interface**

**6 hours**

- 7.1 Introduction PPI Device 8255 A
- 7.2 Internal Block Diagram
- 7.3 252A Modes, Initialization and generation control words
- 7.4 Example of 8255 A interfacing to a micro-computer

## **8. Input and Output Interfaces**

**5 hours**

- 8.1 Serial and parallel Communication
- 8.2 Data transfer wait interface
- 8.3 RS-232
- 8.4 IEEE 488-1978 general purpose interface standard.

## **9. Overview of Intel 8086**

**3 hours**

- 9.1 Block Diagram and Pin Configuration
- 9.2 Introduction to 8086 instruction
- 9.3 Introduction to 8086 assembly language programming

## **Reference Books:**

1. Malvino: Digital Computer Electronics and Introduction to Microcomputers
2. Ramesh S. Gaonkar: Microprocessor Architecture, Programming and Application with 8085, Prentice Hall
3. Morris Mano: Computer System Architecture, Prentice Hall
4. Dougals V. Hall: Microprocessor and Interfacing programming and Hardware, McGraw Hill.

## CMP123.3 Object Oriented Programming

### Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	100	-	100

### Course Objectives:

1. This course aims to provide an introduction to programming using object oriented Language.
2. Students learn the concepts needed to write programs using event-driven, object-oriented.

### Course Contents:

#### 1. Introduction to Object Oriented programming

**4 hours**

Limitation of Procedural Language, object oriented approach, features of object oriented language: Classes, Object, encapsulation, Inheritance, Reusability, Polymorphism

#### 2. Classes and Objects

**9 hours**

Components of Class, scope of Public, Private and protected members, Constructors and constructor overloading Destructors, Class, Object and Memory, Static Data and Class Member, inline function, friend function.

#### 3. Inheritance

**8 hours**

Derived class and base class, Derived class constructors, Overriding member function

#### 4. Polymorphism, Operator Overloading and data type conversion

**7 hours**

Polymorphism, types of polymorphism, Overloading Unary Operators, Overloading Binary Operators, Data type conversion

#### 5. Pointers

**4 hours**

Address and Pointers, this pointer, Pointer and Arrays, Pointers and Function, Pointer and String, Memory management using new and delete,

#### 6. Virtual function and Polymorphism

**5 hours**

Virtual function and normal function, pure virtual function

#### 7. Exception Handling

**4 hours**

Compile time exception handling, Run Time exception handling

#### 8. Templates

**4 hours**

Class template, Function template, template function overloading.

### Lab work

Laboratory work will emphasize on implementation of object oriented programming concepts learned in class.

### Text Book:

R. Lafore: Object Oriented Programming in Turbo C++, Galgotia Publications Ltd. India, 1999

### Reference Book:

David Parsons: Object Oriented Programming with C++

## **CMP 225.3 System Analysis and Design (3-1-0)**

### **Evaluation:**

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

### **Course Objectives:**

1. This course aims to provide to the student the theory and practice of designing information systems to meet user needs, including problem investigation and the analysis, design and implementation of system.
2. Topic include the systems development cycle, system modeling techniques, interface to database management systems, monitoring and control, review and maintenance, and project management. Includes class projects using a CASE tool.

### **Course Contents:**

#### **1. The Context of Systems Analysis and Design**

**3 hours**

##### **Introduction**

##### **A framework for system analysis and design**

**The players-System Stakeholders:** system owners, system users, system designers, system builders, system analyst, external service providers and the project manager.

**Business Drivers for today's information systems:** Globalization of the economy, Electronic commerce and business, security and privacy, Globalization and partnership, Knowledge asset management, Continuous improvement and Total quality management and Business Process redesign.

**Technology Driver's for today's information:** Network and the internet, mobile and wireless technologies, Enterprise application.

**A Simple System Development Process:** System initiation, system analysis, system design, system implementation, system support and continuous improvement.

#### **2. Information System Building Blocks**

**3 hours**

##### **Introduction**

##### **The Product-information systems**

**A Framework for system development architecture:** Knowledge Building Block, Process Building Block, Communication Building Block

##### **Network Technologies and the IS Building Blocks**

#### **3. Information Systems Development**

**4 hours**

##### **Introduction**

**The Process of system development:** The capability maturity model, Life Cycle versus Methodology and Underlying principle for system development.

**A System Development Process:** Where do system development projects come from? The FAST project phases, Cross life cycle activities, sequential versus iterative development.



**Alternative Route and Strategies:** The model driven development strategy, The rapid Application development strategy, The Commercial Application Package Implement strategy, Hybrid Strategy and System Maintenance

**Automated Tools and Technology:** Computer Assisted System Engineering, Application development Environment, Process and Project Managers.

#### 4. System Analysis

6 hours

##### Introduction

**What is Systems Analysis?,**

**Systems Analysis Approaches:** Model-Driven Analysis Approaches, Accelerated Analysis Approaches, Requirements Discovery Methods, Business Process Redesign Methods, Fast Systems Analysis strategies.

**The Scope Definition Phase:** Task 1.1 – Identify baseline Problems and Opportunities, Task 1.2 – Negotiate Baseline Scope, Task 1.3 – Assess Baseline Project worthiness, Task 1.4– Develop baseline schedule and budget, Task 1.5 – Communicate the Project Plan.

**The Problem Analysis phase:** Task 2.1 – Study the Problem Domain, Task 2.2 – Analyze Problems and Opportunities, Task 2.3- Analyze Business Process, Task 2.4 – Establish system Improvement Objectives, Task 2.5- Update the Project Plan Task 2.6- Communication Findings and Recommendation.

**The Requirements Analysis Phases:** Task 3.1 – Identify and Express Requirements, Task 3.2 – Prioritize System Requirements, Task 3.3 – Update the Project plan, Task 3.4 – Communicate the requirement statements.

**The Logical Design Phase:** Task 4.1a- Structure Functional Requirements, Task 4.1b- Prototype Functional Requirements (Alternative), Task 4.2- Validate Functional Requirements, Task 4.3- Define Acceptance Test cases.

**The Decision Analysis Phase:** Task 5.1 – Identify and Express Candidate solution Task 5.2 – Analyze candidate solution, Task 5.3 – Compare Candidate solution, Task 5.4 – Update the Project Plan, Task 5.4 – Update the project plan Task 5.5-Recommend a System Solution.

#### 5. Fact Finding technique for requirement discovery Requirements Discovery 6 hours

##### Introduction

**An introduction to Requirement Discovery**

**The process of Requirement Discovery:** Problem Discovery and Analysis, Requirements Discovery, Documenting and analyzing Requirements, Requirements Management; Requirements Fact Finding Techniques: Sampling of Existing Documentation, Forms and Files, Research and sites Visits, Observation of the work Environment, Questionnaires, Interviews, How to conduct an Interview, Discovery Prototyping, Joint Requirements Planning (JRP); A Fact Finding Strategy.

#### 6. Modeling System Requirements with use cases

6 hours

##### Introduction

**An Introduction to use case Modeling**

**System concepts for Use case diagram:** Use case, Actors, Relationships

**The Process of Requirement Use case Modeling:** Step 1-Identify business Actors, Step 2- Identify Business requirements use cases, Step 3- Construct use case model diagram, Step 4- Document business requirements use case narrations.

**Use case and Project Management:** Ranking and Evaluating use cases, Identify Use cases Dependencies

## **7. Data Modeling and analysis**

**3 hours**

### **Introduction**

**What is data Modeling:** Entities, Attributes, Relationships

**The Process of Logical Data Modeling:** strategy Data modeling, data modeling during Systems Analysis, Looking ahead to systems Design, Automated tools for Data modeling;

**How to construct data models:** Entity Discovery, the context data model, The context data model, The key based data model, Generalized Hierarchies, The fully Attributed data model; **Analyzing the data model:** What is a Good data model?, Data Analysis, Normalization Example;

Mapping Data Requirements to Location

## **8. Process Modeling**

**6 hours**

### **Introduction**

**An Introduction to Process Modeling**

**System concepts for process modeling:** External Agents, Data stores, Process concepts, Data flows,

**The process of Logical process Modeling:** Strategic system Planning, Process modeling for Business Process Redesign, Process Modeling during systems analysis, Looking ahead to System Design Fact-Finding and information Gathering for process modeling, Computer-Aided System Engineering (Case) For Process modeling;

**How to construct processes Models:** The context data flow diagram, the functional Decomposition Diagram, The Event-Response or Use case list, Event Decomposition Diagrams, Event Diagrams, The system Diagram (s), Primitive Diagrams, Completing the specification:

**Synchronizing of system models:** Data and Process Model synchronization, process Distribution, The Next Generation

## **9. Feasibility Analysis and the System Proposal**

**4 hours**

### **Introduction**

**Feasibility Analysis and the System Proposal:** Feasibility Analysis- A Creeping Commitment Approach, system Analysis-preliminary investigation Checkpoint, System Analysis-Problem Analysis Checkpoint, System Design Decision Analysis Checkpoint; Four Tests for feasibility, Economic Feasibility, The Bottom line; Cost-Benefit Analysis Techniques: How Much will the system cost?, What Benefits will the system Provided ?, Is the Proposed system cost effective?, Feasibility Analysis of Candidate systems" Candidate systems Matrix, Feasibility Analysis Matrix; The system Proposal: Written Report Formal Presentation.

## **10. System Design Methods**

**5 hours**

### **Introduction**

#### **Systems Design:**

#### **What is a system Design?**

**System Design Approaches:** Model-Driven Approaches, Rapid Application Development (RAD) Fast system design strategies;

**System Design for in-house Development-** The "Build" solution: Task 5.1 – Design the Application Architecture Task 5.2 – Design the system Database (s), Task 5.3 – Design the system interface Task 5.4- Package design specification, Task 5.5-Update the Project Plan; **System Design for integrating commercial software The "Buy" solution:** Task 4.1-Research Technical Criteria and Options, Task 4.2-Solicit Proposals (or Quotes) from vendors, Task 5a.1 – Validate Vendor Claims and Performances, Task 5a.2-Evaluate and Rank vendor Proposals, Task 5a.3-Award (or Let) Contract and Debrief Vendors, Impact of Buy Decisions on Remaining Life Cycle Phase.

## **11. Project Management**

**2 hours**

### **Introduction**

**What is Project Management?:** The Causes of Failed Projects, The Project Management Body of Knowledge; The Project Management life Cycle: Activity 1- Negotiate Scope, Activity 2-Identify Tasks, Activity 3- Estimate task Duration, Activity 4-Specify inter-task Dependences, Activity 5-Assign Resources, Activity 6-Direct the Team Effort, Activity 7-Monitor and Control Progress, Activity 8-Assess Project Result and Experiences.

### **Text Book:**

Jeffery L. Whitten Lonnie D. Bently Kevin C. Dittman, “Systems Analysis and Design Methods”, Tata McGraw-Hill, 7th Ed.

## Computer Graphics and Multimedia (4-1-2)

### Evaluation:

	Theory	Practical	Total
Internal	30	20	50
Final	50	-	50
Total	80	20	100

### Course Objectives:

1. To introduce basic concepts of 2D and 3D graphics.
2. The provide knowledge of various graphics algorithms and their techniques.
3. The provide knowledge of multimedia and its various components.

### Course Contents:

Unit No.	Topic	Hours
1.	<b>Introduction of CG and Basic concepts of Drawing</b> 1.1 Introduction and Development of Graphics system 1.2 Application of Computer graphics	2
2.	<b>Overview of Graphics system</b> 2.1 Input Devices: Data Glove, Touch Panel, Digitizers 2.2 Video display devices: Refresh cathode-Ray Tubes, Color CRT display, Flat-panel display(LCD, LED and Plasma Display) 2.3 Frame Buffer, Video Controller 2.4 Raster-Scan systems 2.5 Random-scan systems,	6
3.	<b>2D Graphics algorithm</b> 3.1 DDA line drawing algorithm 3.2 Bresenham's line drawing algorithm 3.3 Midpoint Circle Algorithm	4
4.	<b>2D Graphics transformations and Viewing</b> 4.1 Two-Dimensional Geometric transformations: Translation, Rotation, Scaling, 4.2 Composite transformation, Homogenous Co-Ordinate System 4.3 Two-Dimensional object to screen viewing(Window to viewport co-ordinate transformation only) 4.4 Clipping and Cohen Sutherland clipping algorithm	6
5.	<b>3D Graphics</b> 5.1 Non planner surfaces(Bezier Curve and surfaces) 5.2 Methods of generating non-planner surfaces, Polygon Table, Polygon mesh and Plane equation 5.3 Three-Dimensional Geometric transformations: Translation, Rotation, Scaling,	8





5.4 Three- Dimensional object to screen viewing	
5.5 Parallel Projection(Oblique and orthographic), Perspective Projections	
5.6 Visible surface detection methods(Back face, Z buffer and Scanline)	
<b>6. Illumination and Rendering</b>	<b>6</b>
6.1 Light Sources	
6.2 Illumination Models: Ambient, Diffuse and Specular	
6.3 Polygon-Rendering methods: Constant-Intensity shading, Gouraud Shading, Phong shading, Fast phong shading,	
6.4 Introduction to OpenGL and its application	
<b>7. Introduction to Multimedia</b>	<b>4</b>
7.1 Definitions	
7.2 Application of Multimedia	
7.3 Multimedia Teams (Project Manager, Multimedia Designer, Interface Designer, Writer, Video Specialist, Audio Specialist, Multimedia Programmer, The Sum of the parts)	
<b>8. Media Software</b>	<b>6</b>
8.1 Basic Tools (Painting and Drawing Tools, 3-D Modeling and Animation Tools, Image Editing Tools, OCR Software, Sound Editing Programs, Animation, Video and Digital movies and Players)	
8.2 Multimedia Authoring Tools, Types of Authoring Tools, Card and Page-bases Authoring Tools, Icon-Based Authoring Tools, Time-Based Authoring Tools, Object-Oriented Tools	
<b>9. Multimedia Building Blocks</b>	<b>12</b>
9.1 Text	
9.1.1 Typefaces and fonts	
9.1.2 Design Issue	
9.1.3 Beyond the Basics	
9.1.4 Bitmap, True Type, Postscript (ATM)	
9.1.5 The Jaggies	
9.1.6 Fontographer, Font Monger, Font Chameleon	
9.1.7 Icons and Symbols	
9.1.8 Animating text and 3D effects	
9.1.9 Logo Motion, Tapestry	
9.1.10 ASCLL- standard only 0-127	
9.2 Sound and Music	
9.2.1 The power of sound	
9.2.2 Multimedia system sounds	
9.2.3 MIDI Vs. Digital Audio-Choosing between MIDI and Digital Audio	
9.2.4 Digital Audio	
9.2.5 Professional Sound standard (Red Book Standard)-Quality and space considerations	
9.3 Color Theory	
9.3.1 Electromagnetic Spectrum	





- 9.3.2 ROYGBIV: 400nm-600nm
- 9.3.3 Additive Color:- RGB
- 9.3.4 Subtractive Color-CMYK
- 9.3.5 Color Models-RGB,HBS,BSL,CIE YUV
- 9.3.6 Perception of Color
- 9.3.7 Graphics and Imaging

#### 9.4 Color Depth and File Size

- 9.4.1 Palette Management
- 9.4.2 Importing Graphics (Painting vs Drawing, Photoshop and Illustrator, Scanning, Photo CD, Digital Photography, still images, Screen Capturer (Cmb-Shft-3 or Print screen)

### 10. Animation and Video

10

#### 10.1 Animation

- 10.1.1 The Power of Motion
- 10.1.2 Principle of Animation
- 10.1.3 Animation Technique
- 10.1.4 Animation file formats

#### 10.2 Video

- 10.2.1 Broadcast Video standards (NTSC, PAL SECAM, HDTV)
- 10.2.2 Integrating computer and Television
- 10.2.3 Recording Formats
- 10.2.4 Video compression (JPEG, MPEG, DVI Indeo, Other Compression Methods, Optimizing Video Files

#### Laboratory:

1. Implementation of line drawing algorithms using C/C++
2. Implementation of mid-point circle drawing algorithm using C/C++
3. Implementation of Two-Dimensional Transformation (Translation, Rotation, Scaling)
4. Implementation of cohen-sutherland clipping algorithm
5. Demonstration of multimedia(Integration of multimedia component)
6. Demonstration of Video Compression Technique using library file
7. Demonstration of Animation technique using any programming language

#### Text Books:

1. Donald Hern and M. Pauline Baker: Computer Graphics, Prentice-Hall.
2. Tay Vaughan: Multimedia: Making it work, 4th ed, Osborne McGraw-Hill Publisher; 1998

#### Reference Books:

1. Malay K. Pakhira, Computer Graphics Multimedia and Animation Second Edition PHI Publication.
2. Computer Graphics: Principles and Practice in C (2nd Edition) [James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes]



## Database Management System (3-1-3)

### Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

### Objectives:

The objective of this course is to provide fundamental concept, theory and practices in design and implementation of DBMS.

### Course Contents:

#### 1. Introduction

(4 hrs)

- 1.1 Concept and applications
- 1.2 Objectives and Evolution
- 1.3 Needs of DBMS
- 1.4 Data abstraction
- 1.5 Data independence
- 1.6 Schema and Instances
- 1.7 Concept of DDL, DML and DCL
- 1.8 Database Manager and users

#### 2. Data Models

(4hrs)

- 2.1 Logical, Physical and Conceptual Model
- 2.2 E-R Model
- 2.3 Relation with UML class diagrams
- 2.4 Alternate data models (Network Data Model, hierarchical Data Model)

#### 3. Relational Model

(4 hrs)

- 3.1 Definitions and terminology
- 3.2 Structure of relational databases
- 3.3 The relational algebra
- 3.4 Schema and Views
- 3.5 Data dictionary

#### 4. Relational Database Query languages

( 8 hrs)

- 4.1 SQL – features of SQL, queries and sub-queries, Join operations, set operations and other SQL constructs
- 4.2 DDL and DML queries in SQL
- 4.3 Stored procedures
- 4.4 QBE

#### 5. Database Constraints and Relational Database Design

( 8 hrs)

- 5.1 Introduction
- 5.2 Integrity constraints
- 5.3 Referential Integrity
- 5.4 Assertions and Triggers





- 5.5 Functional dependencies
- 5.6 Normalization and Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF)
- 5.7 Multivalued Dependencies
- 5.8 Decomposition of relation schemes

## **6. Security**

**(3 hrs)**

- 6.1 Needs of security
- 6.2 Security and integrity violations
- 6.3 Access control
- 6.4 Authorization
- 6.5 Security and Views
- 6.6 Encryption and decryption

## **7. Query Processing**

**(3 hrs)**

- 7.1 Introduction to query processing
- 7.2 Equivalence of expressions
- 7.3 Query cost estimation
- 7.4 Query Optimization

## **8. File organization and indexing**

**(4 hrs)**

- 8.1 Disks and storage
- 8.2 Organization of records into blocks
- 8.3 File organizations - The sequential and the indexed sequential file organizations
- 8.4 B+ Tree index
- 8.5 Hash index

## **9. Crash Recovery**

**(3 hrs)**

- 9.1 Failure classification
- 9.2 Concept of log-based recovery and shadow paging
- 9.3 Data Backup/Recovery
- 9.4 Remote backup system

## **10. Transaction Processing and Concurrency Control**

**(4 hrs)**

- 10.1 Introduction to Transactions
- 10.2 ACID properties of transaction
- 10.3 Schedules and Serializability
- 10.4 Concepts of locking for concurrency control

## **11. Advanced Database concepts**

**(3 hrs)**

- 11.1 Object-Oriented Model
- 11.2 Object-Relational Model (ORM)
- 11.3 Distributed databases
- 11.4 Concepts of Data Warehouses

### **Laboratory:**

There shall be enough laboratory exercises based on some RDBMS (like ORACLE, MS-SQL server, MySQL, etc) to complement theoretical part studied. An individual project should be given to each student. 10% of sessional marks should be allocated for evaluation for lab works and project.





**Text Book:**

H. F. Korth and A. Silberschatz, *Database System Concepts*, McGraw Hill.

**Reference Books:**

1. K. Majumdar and P. Bhattacharaya, *Database Management Systems*, Tata McGraw Hill, India.
2. R. E. Mani and S. C. Nevathe, *Fundamentals of Database Systems*, Benjamin/Cummings Publishing Co. Inc.
3. G.C Everest, *Database Management*, McGraw Hill.





## Numerical Methods (3-1-3)

### Evaluation:

	Theory	Practical	Total
Internal	30	20	50
Final	50	-	50
Total	80	20	100

### Course Objectives:

1. To introduce numerical methods for interpolation, regressions, and root finding to the solution of problems.
2. To solve elementary matrix arithmetic problems analytically and numerically.
3. To find the solution of ordinary and partial differential equations.
4. To provide knowledge of relevant high level programming language for computing, implementing, solving, and testing of algorithms.

### Course Contents:

#### 1. Solution of Nonlinear Equations

(10 hrs)

- 1.1 Review of calculus and Taylor's theorem
- 1.2 Errors in numerical calculations
- 1.3 Bracketing methods for locating a root, initial approximation and convergence criteria
- 1.4 False position method, secant method and their convergence, Newton's method and fixed point iteration and their convergence.

#### 2. Interpolation and Approximation

(7 hrs)

- 2.1 Lagrangian's polynomials
- 2.2 Newton's interpolation using difference and divided differences
- 2.3 Cubic spline interpolation
- 2.4 Curve fitting: least squares lines for linear and nonlinear data

#### 3. Numerical Differentiation and Integration

(5 hrs)

- 3.1 Newton's differentiation formulas
- 3.2 Newton-Cote's, Quadrature formulas
- 3.3 Trapezoidal and Simpson's Rules
- 3.4 Gaussian integration algorithm
- 3.5 Romberg integration formulas.

#### 4. Solution of Linear Algebraic Equations

(10 hrs)

- 4.1 Matrices and their properties
- 4.2 Elimination methods, Gauss Jordan method, pivoting
- 4.3 Method of factorization: Dolittle, Crout's and Cholesky's methods
- 4.4 The inverse of a matrix
- 4.5 Ill-Conditioned systems
- 4.6 Iterative methods: Gauss Jacobi, Gauss Seidel, Relaxation methods
- 4.7 Power method.





## 5. Solution of Ordinary Differential Equations

(8 hrs)

- 5.1 Overview of initial and boundary value problems
- 5.2 The Taylor's series method
- 5.3 The Euler Method and its modifications
- 5.4 Huen's method
- 5.5 Runge-Kutta methods
- 5.6 Solution of higher order equations
- 5.7 Boundary Value problems: Shooting method.

## 6. Solution of Partial Differential Equations

(5 hrs)

- 6.1 Review of partial differential equations
- 6.2 Elliptical equations, parabolic equations, hyperbolic equations and their relevant examples.

### Laboratory:

Use of Matlab/Math-CAD/C/C++ or any other relevant high level programming language for applied numerical analysis. The laboratory experiments will consist of program development and testing of:

1. Solution of nonlinear equations
2. Interpolation, extrapolation, and regression
3. Differentiation and integration
4. Linear systems of equations
5. Ordinary differential equations (ODEs)
6. Partial differential equations (PDEs)

### Text Books:

1. Gerald, C. F. & Wheatly, P. O. *Applied Numerical Analysis* (7<sup>th</sup> edition). New York: Addison Wesley Publishing Company.
2. Guha, S. & Srivastava, R. *Numerical Methods: For Engineers and Scientists*. Oxford University Press.
3. Grewal, B. S. & Grewal, J. S. *Numerical Methods in Engineering & Science* (8<sup>th</sup> edition). New Delhi: Khanna publishers. 2010.
4. Balagurusamy, E. *Numerical Methods*. New Delhi: Tata McGraw Hill. 2010.

### References:

1. Moin, Parviz. *Fundamentals of Engineering Numerical Analysis*. Cambridge University Press, 2001.
2. Lindfield, G. R. & Penny, J. E. T. *Numerical Methods: Using MATLAB*. Academic Press. 2012.
3. Schilling, J. & Harris, S.L. *Applied Numerical Methods for Engineers using MATLAB and C*. Thomson publishers, 2004.
4. Sastry, S. S. *Introductory Methods of Numerical Analysis* (3<sup>rd</sup> edition). New Delhi: Prentice Hall of India. 2002.
5. Rao, S. B. & Shantha, C. K. *Numerical Methods with Programs in Basic, Fortran and Pascal*. Hyderabad: Universities Press. 2000.
6. Pratap, Rudra. *Getting Started with MATLAB*. Oxford University Press. 2010.
7. Vedamurthy, V.N. & Lyengar, N. *Numerical Methods*. Noida: Vikash Publication House. 2009.





## Operating System (3-1-2)

### Evaluation:

	Theory	Practical	Total
Internal	30	20	50
Final	50	-	50
Total	80	20	100

### Objectives:

- To provide the basic concepts and interface of Operating systems.
- To get familiarize with the features of modern operating systems.
- To get familiarize with different functions of the operating systems.

### Course Contents:

Unit	Topic	Hours
1.	<b>Introduction to Operating System</b> <ul style="list-style-type: none"><li>1.1 Introduction and history (Generation of OS)</li><li>1.2 Objectives (Resource manager and extended machine)</li><li>1.3 Types of Operating system</li><li>1.4 Function of Operating system</li><li>1.5 Different Views of OS</li></ul>	2
2.	<b>Operating System Structure</b> <ul style="list-style-type: none"><li>2.1 Introduction</li><li>2.2 Layered System</li><li>2.3 Kernel</li><li>2.4 Types of kernel ( Monolithic/Macro Kernel and Micro/Exo-kernel)</li><li>2.5 Client-server Model</li><li>2.6 Virtual Machines</li><li>2.7 Shell</li></ul>	2
3.	<b>Process Management</b> <ul style="list-style-type: none"><li><b>3.1 Process Concepts (2 Hours)</b><ul style="list-style-type: none"><li>3.1.1 Definitions of Process</li><li>3.1.2 The Process Model</li><li>3.1.3 Process States</li><li>3.1.4 Process State Transition</li><li>3.1.5 The process Control Block</li><li>3.1.6 Operations on processes (creation, Termination, Hierarchies, Implementation)</li><li>3.1.7 Cooperating Processes</li><li>3.1.8 System calls ( Process management, File management,, Directory management)</li></ul></li><li><b>3.2 Threads (1 hr)</b><ul style="list-style-type: none"><li>3.2.1 Definitions of Threads</li><li>3.2.2 Types of Thread Process ( Single and multithreaded process)</li><li>3.2.3 Benefits of Multithread</li><li>3.2.4 Multithreading Models (Many-to-one model, One-to-One Model, Many-to many model)</li></ul></li></ul>	14





### **3.3 Inter-process Communication and synchronization (5 hrs)**

- 3.3.1 Introduction
- 3.3.2 Race condition
- 3.3.3 Critical Regions
- 3.3.4 Avoiding Critical Region : Mutual Exclusion and Serializability
- 3.3.5 Mutual exclusion conditions
- 3.3.6 Proposals for Achieving Mutual exclusion : disabling interrupts, Lock variable, Strict Alteration ( Peterson's Solution), The TSL instruction
- 3.3.7 Sleep and Wakeup
- 3.3.8 Types of Mutual Exclusion (Semaphore, Monitors, Mutexes, Message Passing, Bounded buffer)
- 3.3.9 Serializability: Locking Protocols and Time Stamp Protocols
- 3.3.10 Classical IPC Problems (Dining Philosophers Problems, The readers and writers problem, the Sleeping barber's problem)

### **3.4 Process Scheduling ( 6 hrs)**

- 3.4.1 Basic Concept
- 3.4.2 Type of Scheduling (Preemptive scheduling, Nonpreemptive scheduling, batch, Interactive, real time scheduling)
- 3.4.3 Scheduling Criteria or Performance Analysis
- 3.4.4 Scheduling Algorithm (Round-robin, First come first served, Shortest-job-first, Shortest process next, Shortest remaining Time next, real time, priority fair share, guaranteed, Lottery scheduling, HRN, multiple Queue, Multilevel feedback queue)
- 3.4.5 Some Numerical examples on scheduling

## **4. Deadlocks**

4

- 4.1 System Model
- 4.2 System Resources: Preempt able and Non preemptable
- 4.3 Conditions for Resource Deadlocks
- 4.4 Deadlock Modeling
- 4.5 The OSTRICH Algorithm
- 4.6 Method of Handling Deadlocks
- 4.7 Deadlock Prevention
- 4.8 Deadlock Avoidance: Banker's Algorithm
- 4.9 Deadlock Detection: Resource allocation graph
- 4.10 Recovery from Deadlock
- 4.11 Starvation

## **5. Memory Management**

9

### **5.1 Basic memory management ( 3 Hours)**

- 5.1.1 Introduction
- 5.1.2 Memory hierarchy
- 5.1.3 Logical versus Physical Address Space
- 5.1.4 Memory Management with Swapping: Memory Management with bitmaps and with linked list
- 5.1.5 Memory Management without Swapping
- 5.1.6 Contiguous-memory Allocation: Memory protection, Memory Allocation, Fragmentation ( Inter fragmentation and external fragmentation)
- 5.1.7 Non-contiguous memory allocation
- 5.1.8 Fixed Partitioning vs. Variable Partitioning
- 5.1.9 Relocation and protection
- 5.1.10 Coalescing and Compaction





## 5.2 Virtual Memory (6 Hours)

- 5.2.1 Background
- 5.2.2 Paging
- 5.2.3 Structure of Page Table: Hierarchical page table, Hashed page table, Inverted page table, Shared Page Table
- 5.2.4 Block Mapping vs. direct mapping
- 5.2.5 Demand paging
- 5.2.6 Page replacement and Page Faults
- 5.2.7 Page replacement algorithms: FIFO, OPR, LRU, SCP
- 5.2.8 Some numerical examples on page replacement
- 5.2.9 Thrashing
- 5.2.10 Segmentation
- 5.2.11 Segmentation with Paging

## 6. Input/ Output Device Management

5

- 6.1 Principle of I/O Hardware: I/O Devices, Device Controllers, Memory Mapped I/O, Direct memory Access
- 6.2 Principle of I/O Software: Goals of I/O Software, Program I/O, Interrupt –driven I/O, I/O Using DMA
- 6.3 I/O Software Layers: Interrupts Handler, Device drivers, Device Independent I/O Software, User –Space I/o Software
- 6.4 Disk: Disk Hardware,
- 6.5 Disk Scheduling: Seek Time, Rational Delay, Transfer Time
- 6.6 Disk Scheduling Algorithms: FCFS Scheduling, SSTF Scheduling, SCAN Scheduling, C-SCAN Scheduling, Lock Scheduling
- 6.7 RAID

## 7. File System Interface Management

3

- 7.1 File concept: File Naming, File structure, File Type, File Access, File Attributes, File Operation, and File descriptors
- 7.2 Directories: Single-level directory systems, Hierarchical Directory Systems, Path names, Directory operation
- 7.3 Access Methods: Sequential, Direct
- 7.4 Protection: Types of access, Access control List, Access control Matrix
- 7.5 File System Implementation: Contiguous allocation, Linked list allocation, linked list allocation using an Index, I-nodes, security and multimedia files

## 8. Security Management

2

- 8.1 Introduction
- 8.2 Security problems
- 8.3 User Authentication: Passwords, password Vulnerabilities, Encrypted password, one time password and Biometrics password
- 8.4 User Authorization
- 8.5 Program Threats: Trojan Horse, Trap Door, Stack and Buffer overflow,
- 8.6 System Threats: Worms, Viruses, Denial of Services

## 9. Distributed Operating System

4

- 9.1 Introduction
- 9.2 Advantages of distributed system over centralized System
- 9.3 Advantages of distributed system over Independent PCs
- 9.4 Disadvantages of distributed System
- 9.5 Hardware and Software Concepts
- 9.6 Communication in distributed systems
- 9.7 ATM





- 9.8 Layered protocols
- 9.9 The Client server Model
- 9.10 Message passing
- 9.11 Remote procedure Call
- 9.12 Process in distribution system
- 9.13 Clock Synchronization

#### 10. Case Study

- 10.1 DOS and Windows Operating System
- 10.2 Unix Operating System
- 10.3 Linux Operating System

2

#### 11. Future Issues

- 11.1 Memory wall
- 11.2 Some future of OS about speed (will the web browser swallow the OS)

1

#### Practical/Lab works

S. N.	Title	Description	Requirements
1	Familiarize with terminology	Introduction and demonstration with Program, Process, threads, system calls, shells and kernels, user interface, type of operating systems, operating systems structure and directory hierarchy.	A machine with Linux operating systems
2	Study of system calls and their organization	Demonstration of common systems calls- fork(), open(), close(), write(), wait(), kill(), etc and implementation of any one command using C/C++ programming language	Use the terminal or any shell to demonstrate systems call using process tracing command
3	Simulation of Process scheduling Algorithm	Implementation of process scheduling algorithms- FCFS, SFJ, RR and priority	Use any high level programming language
4	Study of Inter-process communication methods	Study and Implementation of Monitor, Semaphore, consumer and producer problems	Use any high level programming
5	Study of memory management Schemes and data structures	Study and Implantation of the memory management schemes and algorithms	Use features of operating systems
6	Implementation of Bankers algorithm	Resource allocation schemes of scheduler to prevent the deadlock	User C/C++ programming language.
7	Implementation of Disk arm scheduling algorithms	Write a program for disk arm scheduling through FCFS, SSJF, SCAN, C-SCAN for minimization of movement	Use C /C++ programming language.

#### Text Book:

Andrew s. Tanenbaum, "Modern Operating System", PHI, 6<sup>th</sup> Ed. 2011/12

#### Reference Books:

1. Silberschatz, P.B. Galvin, G. Gagne "Operating System Concepts", Wiley, 8<sup>th</sup> Ed.
2. Andrew s. Tanenbaum, "Distributed Operating System", Pearson
3. D M Dhamdhare , "System Programming and Operating System" - Tata McGraw-Hill , 2009
4. P. Pal Choudhury, "Operating Systems Principles and Design", PHI, 2011





## Visual Programming (3-1-3)

### Evaluation:

	Theory	Practical	Total
Internal	30	20	50
Final	50	-	50
Total	80	20	100

### Course Objectives:

1. To describe how executable code is created with a compiled language.
2. To apply the power of .Net technologies.
3. To familiarize with VB.Net editor and to create fairly sophisticated applications.
4. To know the concept of object oriented event driven programming.
5. To familiarize with the graphics and local resources handling.
6. To build application with integration of VB.Net and Database.

### Course Contents:

Unit No	Topic	Hours
<b>1. Introduction</b>		<b>4</b>
1.1	Introduction to .NET	
1.2	Introduction to .NET framework and common language run time	
1.3	New Features of .NET Framework 4.0	
1.4	Framework class library	
1.5	Meta Data and Assemblies	
1.6	LINQ	
1.7	Introduction to visual studio	
1.8	Project basics	
1.9	Types of project in .Net.	
1.10	Simple project demo both windows base and console base	
<b>2. The VB.NET Basic</b>		<b>5</b>
2.1	Variables and constant	
2.2	Variables –Declaring	
2.3	Data Types	
2.4	Forcing variables declarations	
2.5	Strings	
2.6	Scope & lifetime of a variable	
2.7	Data type conversion	
2.8	Operators	
2.9	Arrays, types of arrays	
2.10	Enumeration	
<b>3. The VB.NET Control flow statements</b>		<b>5</b>
3.1	Introduction	
3.2	Conditional Statements(if and switch case)	





- 3.3 Iteration Statements (Do while , While, For loop, for each and For Each-Next loop)
- 3.4 Jump statements: go to, exit ,continue and return
- 3.5 Msg box & Input box

#### **4. The VB.Net Procedure, function, Exceptions handling**

7

- 4.1 Sub Routines
- 4.2 functions
- 4.3 type arguments
- 4.4 optional arguments
- 4.5 returning value from function
- 4.6 Scope
  - 4.6.1 Block Scope
  - 4.6.2 Procedure Scope
  - 4.6.3 Module Scope
  - 4.6.4 Namespace Scope.
- 4.7 Introduction of exception
- 4.8 Unstructured Exception Handling
- 4.9 Structured Exception Handling
- 4.10 Raising an Exceptional Intentionally (by using unstructured method)
- 4.11 Exception filtering in the Catch Block
- 4.12 Multiple Catch
- 4.13 Finally Statement
- 4.14 Throwing an Exception
- 4.15 Throwing a Custom Exception

#### **5. The VB.Net Object Oriented Programming**

6

- 5.1 Classes and object
- 5.2 Creating constructor & destructor
- 5.3 creating and Implementation inheritance
- 5.4 Implementing shadowing
- 5.5 Access Modifiers
- 5.6 Creating abstract classes and methods
- 5.7 Over loading and overriding

#### **6. The VB.Net Forms and User Inter face Elements**

10

- 6.1 Loading
- 6.2 Showing and hiding forms
- 6.3 controlling One form within another
- 6.4 Creating MDI application
- 6.5 Components of Windows Form
- 6.6 Timer. Their properties, methods, and events
- 6.7 The VB.Net Menus, and Built-in Dialog Boxes
- 6.8 Labels, Text box, Ritch Text Box, Masked Text Box Control, Buttons, Checkboxes ,Radio Buttons List boxes, Checked List Boxes, Split Container Control, Combo Box, Picture boxes, Scroll bar, Group Box, Image List ,Tree View, List View, Tab Control, Panels, Month Calendar,



<b>7. The VB.Net Graphics and File Operations</b>	<b>4</b>
7.1 Introduction to Graphics Handling	
7.2 Drawing and fillings Different type of graphics: Circle, line, Rectangle, square, Drawing Image etc.	
7.3 Writing and Reading text data	
7.4 Reading and Writing Binary data	
<b>8. Database programming with ADO.NET</b>	<b>7</b>
9.1 Over view of ADO.NET	
9.2 Architecture of ADO.NET	
9.3 Accessing Data using Server Explorer	
9.4 Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB	
9.5 Display Data on data bound controls and data on data grid.	

**Text Book:**

VB.NET 2010 Programming Black Book – Steven Kogent (Dreamtech pub.)

**Reference Books:**

1. Introduction to .NET framework-Worx publication
2. Mastering VB.NET by Evangelos petroutsos- BPB publications
3. Visual Studio 2010 and .NET 4 Authors: Istvan Novak, Andras Velvart, Adam Granicz. ISBN-0470499486.
4. VB.NET Programming Black Book – Steven Holzner (Dreamtech pub.)





## Project II (0-0-2)

### Evaluation:

	Theory	Practical	Total
Internal		50	50
Final		50	50
Total		100	100

### Course Objectives:

1. To develop the concept about programming using PLT.
2. Implementing various programming technique using SAD.
3. To develop the real based project using programming language VB .Net and database System language.

### Course Duration: 30 hours

### Course Contents:

The following are documentation guidelines to be given to each student along with an assignment that should cover most of the main topics given in the framework.

- Cover Page
  - Executive summary
  - Acknowledgment
1. Introduction
  2. The Assignment project
  3. Objective of Assignment project
  4. Time Plan for the work assigned
  5. Investigation of the problems
  6. System Analysis
    - 6.1 Feasibility study
    - 6.2 Context Diagram
    - 6.3 Data Flow Diagram
  7. System Design
    - 7.1 ER and implementation
    - 7.2 User interface
  8. Program Specification
  9. Algorithms
  10. Flowchart or Decision tree or Decision Table or Structure English
  11. Program coding
  12. Input test Data
  13. Program Testing
  14. Output/Reports
  15. Computer (software and Hardware) requirement to run this program
  16. Software Installation and operation procedures



17. Comments on the Assignment project if any (How did he/she find it? Time provided and resources along with teacher's guidance at required of the student or not. What improvement you would make if certain asked thing provided to you?)
18. Conclusion and recommendation
19. Users Manual

### **Special Attention**

Each student should be given ample opportunity to use computer system for the assigned project work. Sample format of project work could be given to the students before assigning the work.

The computer system must have required necessary software packages and program installed in order to accomplish the tasks assigned to them. Teacher could guide students during the development work assign to students. **Generally, individual project is more preferable** because he/she can learn more on project but project work can be done in group (maximum of 5 persons in each group).



## Computer Architecture (3-1-1)

### Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

### Course Objectives:

- To acquaint the students with the fundamentals of computer systems.
- To apprise the students with the architectural and associated components of computer systems.
- To aware the students about the architecture of the computer systems available in the market.

### Course Contents:

- 1. Introduction** **4 hrs**
  - 1.1. Computer Organization and Computer Architecture
  - 1.2. Review of Evolution of Computer System
  - 1.3. Basic Structure of Computer System
  - 1.4. Examples of Computer Families
  - 1.5. Future Trends in Computer
  - 1.6. Review of Instruction Sets, Addressing Modes and Instruction Formats
- 2. Register Transfer and Micro Operations** **2 hrs**
  - 2.1. Register Transfer and RTL
  - 2.2. Micro operations
  - 2.3. Data Transfer Micro operations
  - 2.4. Arithmetic and Logical Micro operations
  - 2.5. Shift Micro operations
  - 2.6. Introduction to HDL and VHDL
- 3. Central Processing Unit** **3 hrs**
  - 3.1. CPU Organization/Structure
  - 3.2. Register Organization and Data Paths
  - 3.3. Instruction Cycle
  - 3.4. Arithmetic and Logical Unit
  - 3.5. Design Principles for Modern Systems
- 4. Computer Arithmetic** **6 hrs**
  - 4.1. Integer Representation

- 4.2. Integer Arithmetic
- 4.3. Unsigned Binary Addition and Subtraction
- 4.4. Unsigned Binary Multiplication Algorithm
- 4.5. Booth's Algorithm
- 4.6. Unsigned Binary Division Algorithm
- 4.7. Floating Point Representation
- 4.8. BCD Arithmetic Unit
  - BCD Adder
- 4.9. Arithmetic Pipelining
  
- 5. Control Unit 6 hrs**
  - 5.1. Control of the Processor
  - 5.2. Hardwired Control Unit
    - Control Unit Inputs
    - Control Unit Logic
  - 5.3. Micro programmed Control Unit
    - Micro Instructions and Its Types
    - Architecture of Micro programmed Control Unit
  - 5.4. Micro Instruction Sequencing
  - 5.5. Micro Instruction Execution
  - 5.6. Applications of Hardwired and Micro programmed Control Units
  
- 6. Memory Organization 6 hrs**
  - 6.1. Memory Hierarchy
  - 6.2. Main Memory
    - RAM and ROM
  - 6.3. Auxiliary Memory
    - Magnetic Disks and Tapes
    - Optical Disks
    - Flash Drives
    - Review of RAID
  - 6.4. Associative Memory
    - Hardware Organization
    - Address Matching Logic
    - Read/Write Operations
  - 6.5. Cache Memory
    - Cache Initialization
    - Mapping Cache Memory
      - Direct, Associative and Set Associative Memory Mapping
    - Write Policy
    - Replacement Algorithms
  
- 7. Input Output Organization 4 hrs**
  - 7.1. External Devices

- 7.2. I/O Module Structure
- 7.3. Review of Programmed I/O and Interrupt Driven I/O
- 7.4. Review of DMA, I/O Channels and I/O Processors
- 7.5. External Interfaces

**8. Reduced Instruction Set Computers 5 hrs**

- 8.1. RISC VS. CISC
- 8.2. RISC Pipelining
- 8.3. Instruction Pipelining
- 8.4. Conflicts in Instruction Pipelining and their Solutions
- 8.5. Introduction to Register Windows and Register Renaming

**9. Introduction to Parallel Processing 6 hrs**

- 9.1. Parallelism in Uniprocessor System
- 9.2. Multiprocessor Systems and their Characteristics
- 9.3. Flynn's Classification
- 9.4. Interconnection Structures in Multiprocessors
- 9.5. Cache Coherence
- 9.6. Introduction to Vector Processing and Array Processors
- 9.7. Introduction to Multithreaded Architecture

**10. Multicore Computers 3 hrs**

- 10.1. Hardware Performance Issues
  - Increase in Parallelism
  - Alternative Chip Organizations
  - Power Consumption
- 10.2. Software Performance Issues
  - Software on Multicore
- 10.3. Multicore Organization
- 10.4. Dual Core and Quad Core Processors
- 10.5. Power efficient Processors

**Laboratory**

The individual student should develop a project or perform a case study on Computer Architecture. The topic could be either initiated by the student or selected from a list provided by the instructor. An oral presentation with a demonstration in case of project should be part of the laboratory. Reports must be prepared.

**Text Books:**

1. Stallings, W., "*Computer Organization and Architecture*", Eighth Edition, 2011, Pearson.
2. Mano, M. M., "*Computer Systems Architecture*", Third Edition, 2011, Pearson.

**References:**

1. Tanenbaum, A.S., “*Structured Computer Organization*”, Fourth Edition, 2003, Pearson Education.
2. Carpinelli, J.D., “*Computer Systems Organization and Architecture*”, 2012, Pearson.
3. Rajaraman, V. et al, “*Computer Organization and Architecture*”, 2011, PHI.
4. Sima, D. et al, “*Advanced Computer Architecture*”, 2000, Addison Wesley.



# Data Communication and Computer Network

## Evaluation:

	Theory	Practical	Total
Sessional	40	10	50
Final	50	-	50
Total	90	10	100

## Course Objectives:

1. This course aims to provide the study of computer systems, computer communications and computer networks.
2. The Course includes different kinds of networking topologies and their structure and design.
3. This course also covers the telephone system, electronic email, data flows, networking protocols, and organization around ISO-OSI seven-layer architecture, with review of each layer.

## Course Contents:

### 1 Background Study and revision

3 hrs

- 1.1 Introduction and necessity of computer networking,
- 1.2 Networks goals/ motivation,
- 1.3 Networks protocols, and networking model.
- 1.4 Application and use of networks

### 2 Data transmission

3 hrs

- 2.1 Transmission terminology (Simplex, Duplex, Half Duplex)
- 2.2 Bandwidth and frequency
- 2.3 Serial and parallel communication
- 2.4 Analog and digital transmission
- 2.6 Transmission impairments (attenuation and delay distortion, concept of delay, noise)
- 2.7 Asynchronous and synchronous transmission

### 3 Multiplexing and Switching

4 hrs

- 3.1 Multiplexing ( Frequency division multiplexing, synchronous time division multiplexing, time division multiplexing)
- 3.2 Modems, modulation and its types (pulse, amplitude, frequency and phase)
- 3.3 Switching and its types

### 4 Reference Model

5 hrs

- 4.1 Protocol Layers: Introduction, layered architecture
- 4.2 The Internet protocol stack
- 4.3 network entities and layers
- 4.4 OSI reference Model

<b>5</b>	<b>Physical layers and its design issues</b>	<b>3 hrs</b>
	5.1 Bounded transmission media (Twisted Pair Cable, Co-axial: Base-band cable, Broad-band cable, fiber Optical).	
	5.2 Unbounded transmission media (micro wave, satellite)	
	5.3 Introduction of ISDN and PSTN	
<b>6</b>	<b>Data Link Layer</b>	<b>7 hrs</b>
	6.1 Framing	
	6.2 Basics of error detection and correction,	
	6.3 Cyclic redundancy Check code for error detection,	
	6.4 Flow control	
	6.5 Retransmission strategies (stop-&-wait ARQ, GO-Back-NARQ, Selective Repeat ARQ, and Pipelining)	
	6.6 Sliding window protocols.	
<b>7</b>	<b>TCP/IP Reference Model</b>	<b>9 hrs</b>
	7.1 Introduction of TCP/IP Model	
	7.2 IPV4 frame Format	
	7.3 IP Addresses and class, Subnet class	
	7.4 Subnet calculation ,masking	
	7.5 Introduction of IPV6	
	7.6 Internet multicasting	
	7.7 mobile IP	
	7.8 Comparison with OSI Reference Model	
<b>8</b>	<b>Network layer and Internet Layer</b>	<b>6 hrs</b>
	8.1 Network layer and design Issues	
	8.2 virtual Circuit and Data grams	
	8.3 Introduction of Routing :( Shortest Path Routing Algorithm. Flow Based Routing Algorithm. Distance Vector Routing Algorithm),	
	8.4 Congestion Control and Leaky Bucket Algorithms	
<b>9</b>	<b>Network Servers</b>	<b>5 hrs</b>
	9.1 Servers (HTTP, DHCP, SMTP, DNS, PROXY, FTP)	
	9.2 Examples of client and servers tools	
<b>10</b>	<b>VPN and Network security</b>	<b>3 hrs</b>
	10.1 VPN (Virtual private Networks)	
	10.2 cryptography (symmetric key algorithms, public key algorithm)	
	10.3 Communication security and web security	

## **Laboratory Work**

### **List of Practical:**

1. LAN cabling
2. networks utilities (telnet , netstat, ipconfig, ping, arp, tracert, netview)
3. Computer Networking on Windows Based Platform
4. Installation and Configuration of Different Types of servers
  - a. DHCP Server
  - b. DNS server
  - c. Web server
  - d. Print Server
5. Networking with Unix
6. Network Security and Policies

### **Text Books:**

1. Neil Jenkins and Stan Schatt: *Understanding Local Area Networks, PHI*
2. Andrew S. Tanenbaum: *Computer Networks, PHI*

## Mathematical Foundation of Computer Science (3-2-1)

### Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	80	-	100

### Course Objectives:

1. The main objective of this course is to build up the mathematical foundation for the study of computational science and computer technology.
2. This course introduces the student to discrete mathematics and finite state automata through an algorithmic approach and focuses on various problems solving technique.
3. It helps the target student in gaining fundamental and conceptual clarity in the area of Logic Reasoning. Algorithms, Recurrence relation. Graph Theory, and Theory of Automata.

### Course Contents:

- 1. Graph Theory (15 hrs)**
  - 1.1 Definitions
  - 1.2 Directed and Undirected Graphs
  - 1.3 Walk, Path, Circuits,
  - 1.4 Connected Components. Connected Component Algorithm
  - 1.5 Shortest –Path Algorithms
  - 1.6 Computer representation a graph (Static Representation only, like Adjacency Matrix, Incidence Matrix, Path Matrix)
  - 1.7 Bi-partite graphs
  - 1.8 Regular graphs
  - 1.9 Planar graphs
  - 1.10 Euler graph
  - 1.11 Hamilton graph and their properties and characterization.
  - 1.12 Application of graph theory in computer science (with example).
- 2. Logic and Induction (8 hrs)**
  - 2.1 Propositions and Truth functions
  - 2.2 Predicates and Quantification
  - 2.3 Propositional and Predicate Logic
  - 2.4 Expressing statement in the language of Logic
  - 2.5 Deduction in Predicate Logic
  - 2.6 Elementary Step-wise Induction and Complete Induction.
- 3. Introduction to Mathematical Reasoning (7 hrs)**
  - 3.1 Formal Languages and Inductive Definitions: Axioms,

- 3.2 Rules of Inference and Proofs
- 3.3 Direct Proof and Indirect Proof
- 3.4 Formal Proof and Informal Proof.

**4. Recurrence Relations (7 hrs)**

- 4.1 Recursive Definition of Sequences
- 4.2 Differencing and Summation
- 4.3 Solution of Linear Recursive Relation
- 4.4 Solution of Non-linear Recurrence Relation.

**5. Finite State Automata (8 hrs)**

- 5.1 Alphabets and Language
- 5.2 Notion of a State
- 5.3 State Machine (FSM and DFA)
- 5.4 Regular Expression
- 5.5 Equivalence Relation.

**References:**

1. Richard Johnsonbaugh, Discrete Mathematics, Fifth Edition, Addison Wesley, Pearson Education Asia (LPE), ISBN: 81-780-82799, 2000
2. Mott, Joe L., Kandel Abraham and Baker, Theodoe P., Discrete Mathematics for Computer Scientists and Mathematicians, Second Edition, Prentice-Hall, ISBN: 81-203-1502-2
3. Liu, C.L., Elements of Discrete Mathematics, TMH, 2000, ISBN: 0-07-043476-X
4. Trus, J., Discrete Mathematics for Computer Scientists, Second Edition, Addison Wesley ISBN: 0-201-36061,1999

# Software Engineering

## Evaluation:

	Theory	Practical	Total
Sessional	40	10	50
Final	50	-	50
Total	90	10	100

## Course Objectives:

To provide required knowledge on planning, design, development, implementation, and maintenance of software.

## Course Contents:

### 1 Introduction

4 hrs

- 1.1 History of software engineering
- 1.2 Introduction
- 1.3 Role of software engineering
- 1.3 Software Development and Software Engineering
- 1.4 Attribute of good software
- 1.5 Different between software engineering and system Engineering
- 1.6 Some challenges of software Engineering.
- 1.7 Software Engineering Ethics

### 2. Software Specification

4 hrs

- 2.1 The Uses of Specification: A statement of User requirement, A statement of the interface between the machine and the control environment, A statement of the requirement for the implementation, A reference point during product maintenance
- 2.2 Specification Qualities
- 2.3 Classification of Specification styles
- 2.4 Verification of specifications,
- 2.5 Types of Specification: Operational and descriptive specifications
- 2.6 Operational specifications: DFD UML diagrams for specifying Behaviors, Finite State Machine

### 3. Software Testing Techniques and Strategies

7 hrs

- 3.1 Software Testing Fundamentals
  - 3.1.1 Testing objectives
  - 3.1.2 How test information flows
  - 3.1.3 Testing lifecycle
  - 3.1.4 Test Cases (What it is?)
- 3.2 Levels of Testing
  - 3.2.1 Unit Testing
  - 3.2.2 Integration Testing
  - 3.2.3 System Testing
  - 3.2.4 Acceptance Testing
  - 3.2.5 Alpha testing & Beta testing
  - 3.2.6 Static vs. Dynamic testing
  - 3.2.7 Manual vs. Automatic testing
  - 3.2.8 Testers workbench
  - 3.2.9 11-steps of testing process (Only steps should be covered)
- 3.3 Different types of Testing

- 3.3.1 Installation Testing
- 3.3.2 Usability testing
- 3.3.3 Regression testing
- 3.3.4 Performance Testing
- 3.3.5 Load Testing
- 3.3.6 Stress testing
- 3.3.7 Security testing
- 3.4 Black Box & White Box Testing (Test Case Design Techniques)
  - 3.4.1 Functional Testing (Black Box)
  - 3.4.2 Structural Testing (White Box)
  - 3.4.3 Domain Testing
  - 3.4.4 Non functional testing techniques
  - 3.4.5 Validation testing Activities (Low level testing, high level testing)
  - 3.4.6 Black box vs. White Box

#### **4. Software Qualities and Software Quality Assurance**

**10 hrs**

- 4.1 Software quality and quality assurance
- 4.2 Software quality factors
- 4.3 Software quality assurance
- 4.4 SQA activates
- 4.5 Software quality standards: SEI, ISO
- 4.6 Software reviews
- 4.7 Cost impact of software defects
- 4.8 Defect amplification and removal
- 4.9 Formal technical reviews
- 4.10 The review meeting
- 4.11 Review reporting and record keeping
- 4.12 Review guidelines
- 4.13 A review checklist
- 4.14 Formal approaches to SQA
- 4.15 Proof of correctness
- 4.16 Statistical quality assurance
- 4.17 The clean room process

#### **5. Software reliability**

**6 hrs**

- 5.1 Measures of reliability and availability
- 5.2 Software reliability models
- 5.3 Software safety

#### **6. Management of Software Engineering**

**7 hrs**

- 6.1 Responsibilities of a software project manager
  - 6.1.1 Job responsibilities of a software project manager
  - 6.1.2 Skills necessary for software project management
- 6.2 Project Planning
  - 6.2.1 The SPMP document
- 6.3 Metrics for project size estimation
  - 6.3.1 Line of code (LOC)
  - 6.3.2 Function point metric
- 6.4 Project estimation techniques
  - 6.4.1 Empirical estimation techniques
    - 6.4.1.1 Expert judgment technique
    - 6.4.1.2 Delphi cost estimation
  - 6.4.2 Heuristic techniques

- 6.4.2.1 Basic COCOMO model
- 6.4.3 Analytical estimation techniques
- 6.5 Scheduling
- 6.6 Organization and team structure
  - 6.6.1 Organization structure
  - 6.6.2 Team structure
- 6.7 Staffing
  - 6.7.1 Quality of software engineer
- 6.8 Risk Management
  - 6.8.1 Risk Identification
  - 6.8.2 Risk assessment
  - 6.8.3 Risk containment
- 6.9 Software configuration management
  - 6.9.1 Necessity of software configuration management
  - 6.9.2 Configuration management activities
  - 6.9.3 Source code control system (SCCS) and RCS

## **7. Object-Oriented Concepts and Principles**

**4 hrs**

- 7.1 Object-Oriented Paradigm
- 7.2 Object-Oriented Concepts
- 7.3 Identifying the Elements of an Object Model
- 7.4 Management of Object-Oriented Software Projects

## **8. Emerging Trends**

**3 hrs**

- 8.1 Client server software
- 8.2 CORBA
- 8.3 COM/DCOM
- 8.4 Service oriented architecture (SOA)
- 8.5 Software as a service (SaaS)

### **Case Study:**

An individual case study should be given to each student on software project. 10% of sessional marks should be allocated for evaluation

### **Text Books:**

1. Pressman. R. S. : Software Engineering a practitioners Approach. McGraw Hill
2. Mall. R.: Fundamentals of Software Engineering. PHI.

### **References:**

1. C. Ghezzi, M. Jazayeri, and D. Mandrioli: *Fundamentals of Software Engineering*, Prentice Hall of India, Ltd.
2. Sommerville. I.: Software Engineering, Pearson
3. Bali-Bali: Software Engineering, S.K. Kataria & Sons
4. Pankaj Jalote's: Software Engineering- A precise Approach Wiley India
5. Richard Fairley: Software Engineering Concepts, Tata McGraw-Hill Edition
6. Eve Adersson, Philip Greenspun, Andrew Grumet: Software Engineering or Internet Applications, PHI



# Web Technologies I

## Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

## Course Objectives:

1. To focus on the phenomenon known as World Wide Web (WWW) and Domain name hierarchy.
2. To impart the new concepts in Web Technologies.
3. To identify, evaluate and apply appropriate technologies for web development.
4. To develop understanding about the different technologies used in World Wide Web including the concept of HTML, CSS, Java script, XML and jQuery.

## Learning Outcome

1. This course enables students to understand web page site planning and management.
2. Students will be able to develop advanced HTML pages with help of frames, scripting languages and evolving technologies like CSS, jQuery and XML.

## Course Contents:

### 1 Internet and WWW

4 hrs

- 1.1 Introduction to internet and its applications, Internet service providers, domain name server, internet address;
- 1.2 Protocols used in internet (HTTP, HTTPS, FTP, SMTP, TCP, IP, UDP);
- 1.3 World Wide Web and its evolution, uniform resource locator (URL), web server and browsers;
- 1.4 search engine, meta search engine;
- 1.5 Domain name and its hierarchy, Issues related with domain name registration, DNS concept;
- 1.6 Client server architecture, cross browser communication

### 2 HTML and Graphics

10 hrs

- 2.1 Introduction to HTML, <!doctype>, Creating basic HTML file, core elements and attributes, comment, <meta>;
- 2.2 HTML basis
  - 2.2.1 Basic text formatting, Phrase elements, lists, ordered lists, unordered lists, nesting of lists, Using character entities for special character, <font> element and attributes;
  - 2.2.2 Grouping elements
- 2.3 Links and Navigation
  - 2.3.1 Linking to other web pages, linking to email address, Understanding directories and directories structure, Understanding URLs, Absolute and relative URLs, Advanced email links;
- 2.4 Images, Audio and Video
  - 2.4.1 Adding images, images as link, Image maps, Client side and server side image maps;

2.4.2 Choosing the right image format, Gif images, animated gif, jpeg, png, keeping file size small;

2.4.3 Working with multimedia, Exploring audio and video file formats, describing multimedia elements, <embed>, <object>, <audio>, <video>, embedding video from other websites, initializing an object using <param> element;

## 2.5 Tables

2.5.1 Introducing tables Basic table elements and attributes , Grouping section of table

2.5.2 Nested Tables, Accessible tables, How to linearize tables, using ID, scope and header attributes;

## 2.6 Form

2.6.1 Introducing forms, attributes, controls in form, <fieldset> and <legend> elements;

2.6.2 Focus, Tabbing order, access keys, Disabled and read only controls, Sending form data to the servers, http get, http post

## 2.7 Frames

2.7.1 Introducing frameset, When to use frames, <frameset> element, Attributes,

2.7.2 Nested framesets, Inline or floating frames with <iframe>;

## 2.8 Exploring new elements of HTML 5

2.8.1 <input> types,<keygen>, <progress>, <meter>, <command>, <menu>, <header> and <footer> , Spell check attribute;

# 3 Scripting language

10 hrs

3.1 Introduction to scripting language, Difference between client side and server side scripting language, Features of javascript, What javascript can and cannot do, Using javascript in HTML document;

## 3.2 Programming fundamentals

3.2.1 Variables, operators, control flow statements, popup boxes;

## 3.3 Javascript functions

3.3.1 Defining and invoking a function, function argument, return statement, calling function with timer;

## 3.4 Events and Event Handlers

3.4.1 General Information about Events, Defining Event Handlers, events in javascript

## 3.5 Javascript objects

3.5.1 Properties of an object, methods of an object,

## 3.6 Working with browsers object

3.6.1 Understanding window object, object collection, object properties, object methods;

## 3.7 DOM

3.7.1 Exploring document object methods, understanding DOM nodes;

# 4 Style sheets

10 hrs

4.1 Introduction to stylesheets, Value of stylesheets, stylesheet rules and syntax;

4.2 Creating simple stylesheets, adding comments on style sheets, exploring cascading order, working with properties and selectors, applying multiple properties to selector, grouping selector, applying contextual selectors, applying selector class, applying with associated elements;

4.3 Applying <div> tag to style sheet, applying <span> to stylesheet, linking stylesheets, creating CSS file, linking multiple page to CSS file;

- 4.4 CSS properties
  - 4.4.1 Controlling text, Text formatting, Text pseudo-classes, lengths, Introducing the box model;
  - 4.4.2 Links, backgrounds, lists, tables, outline, positioning and layout with CSS;
- 5 Extensible Markup Language (XML) 6 hrs**
  - 5.1 XML: Introduction, Structure of XML: Logical Structure, Physical Structure;
  - 5.2 Naming Rules, Element Content Models, Element Occurrence Indicators, Character Content
  - 5.3 Document Type Declaration (DTD) and Validation, Developing a DTD
  - 5.4 XML Schema, basic example;
  - 5.5 XSL (Extensible Style Sheet Language) or CSS (Cascading Style Sheet);
  - 5.6 XML processors: DOM and SAX;
- 6 Introducing jQuery 2 hrs**
  - 6.1 Why jquery, JQuery fundamentals, Page layout using jquery;
- 7 Page layout and Design issues 3 hrs**
  - 7.1 Page Layout : Understanding site audience, page size and screen resolution, designing pages, coding your design, developing for mobile devices;
  - 7.2 Design issues : Typography, navigation, tables, forms;

## **Laboratory Work**

### **List of Practical:**

1. Design a web page using different text formatting tags.
2. Design a web page with links to different pages and allow navigation between pages.
3. Design a web page with Image maps.
4. Design a web page with different tables. Include nesting of tables in web page.
5. Design a webpage using frames.
6. Using Java Script design a web page that prints factorial / Fibonacci series / any given series.
7. Design a form with a text box and a command button. Using Java Script write a program whether the number entered in the text box is a prime number or not.
8. Design a form with all controls and validate all the controls placed on the form using Java Script.
9. Design a website using style sheets so that the pages have uniform style.
10. Design a DTD, corresponding XML document and display it in browser using CSS.
11. Design an XML document and display it in browser using XSL.
12. Design XML Schema and corresponding XML document.

### **Text Books:**

1. HTML black book – Steven Holzner, Dreamtech press
2. Beginning HTML, XHTML, CSS and Java Script – Jon Duckett, Wiley India Edition

### **References:**

1. Web Technologies Black Book - Kogent learning solutions
2. Java Script step by step - Steve Suehring East economy edition
3. JQuery in Action – Bear Bibeault, Yehuda Katz
4. The complete reference HTML and CSS - Thomas A. Powell Tata Mcgraw Hill edition

**Applied Economics**  
BCA, Third Year, Sixth Semester

**Evaluation:**

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

**Course Objective:**

The main objective of this course is to impart the fundamental concept of micro and macro economic theory. It aims to enhance the skill of the students in analysis and interpretation of the economic concept with respect to business decision.

**Course Contents:**

- 1. Introduction** **3 hrs**
  - 1.1 Concept of Micro Economics and Macro Economics
  - 1.2 Measurement of Inequality
  - 1.3 Equilibrium, Statics and Dynamics, Stock and Flow ratio variables
- 2. Theory of Consumer Demand** **6 hrs**
  - 2.1 Ordinal Approach (Indifference Curve Analysis)
  - 2.2 Consumer equilibrium, price, income and substitution effect
  - 2.3 Price elasticity of demand and its determinants; Income and Cross elasticity of demand; Price and cross elasticity of supply
  - 2.4 Economics of Speculation
- 3. Analysis of Cost and Revenue** **5 hrs**
  - 3.1 Nature and types of cost curves (traditional as well as modern), relationship among total, average and marginal cost curves
  - 3.2 Nature and types of revenue curves, relationship among total, average and marginal revenue curves
- 4. Theory of Production** **4 hrs**
  - 4.1 Producer's equilibrium in long run ( In terms of minimization of cost and maximization of output)
  - 4.2 Cobb- Douglas Production Function
- 5. Product Pricing** **6 hrs**
  - 5.1 Concept of market equilibrium, concept of firm's equilibrium, tax and subsidy upon market equilibrium and price
  - 5.2 Linear programming
  - 5.3 Cost Benefit method
- 6. Factor pricing** **3 hrs**

Modern theory of factor pricing (Demand and Supply Theory)
- 7. National Income** **2 hrs**

Methods and difficulties of measurement National Income





<b>8. Theories of Employment</b> Principle of Effective demand	<b>2 hrs</b>
<b>9. Consumption, Saving and Investment Functions</b> 9.1 Propensity to consume and multiplier 9.2 Propensity to save and Paradox of thrift 9.3 Investment, marginal efficiency of capital and accelerator	<b>4 hrs</b>
<b>10. Business Cycle</b> Meaning, types, causes, effects and remedies	<b>2 hrs</b>
<b>11. The Mechanism of Foreign Exchange</b> 11.1 The determination of the rate of foreign exchange 11.2 The adjustable 'Peg' system 11.3 Fixed exchange rates and floating exchange rates	<b>3 hrs</b>
<b>12. Macro Stabilizing Policies</b> Fiscal policy, Monetary Policy	<b>2 hrs</b>
<b>13. Economics of Development</b> 13.1 Meaning, challenges and prospects in Nepal 13.2 Global Economy 13.2.1 Concepts of Liberalization, Privatization and Globalization, 13.2.2 Regional Trade Agreements in South Asia, SAARC, BIMSTEC, SAPTA and SAFTA 13.2.3 Multinational Companies, FDI in Nepal, WTO	<b>6 hrs</b>

**Text Books:**

1. Mankiew , N.G.: *Principles of Microeconomics*, Harcourt Brace College Publishers
2. Sampat Mukherjee: *Modern Economic Theory*; Wishwa Prakashan, (A Division of Wiley Eastern Ltd.), New Delhi.
3. Mankiew , N.G.: *Macroeconomics*, New York: Worth Publisher

**References:**

1. D.N. Dwivedi: *Microeconomics Theory and Applications*, Pearson.
2. Dominick Salvatore: *Theory and Problems of Microeconomics*, Schaum's outline series McGraw hill Inc, Singapore.



**Linux (3 – 0 - 3)**  
BCA, Third Year, Sixth Semester

**Evaluation:**

	<b>Theory</b>	<b>Practical</b>	<b>Total</b>
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

**Course Objectives:**

1. To provide strong knowledge of the open source operating system.
2. To provide the knowledge of server program in operating system.

**Course Contents:**

- 1. Introduction** **2 hrs**
  - 1.1 Linux: History and Introduction
  - 1.2 Advantages of Linux over other operating system.
  - 1.3 FAT, NTFS, EXT
  - 1.4 Culture of free software
- 2. Basics of Linux** **5 hrs**
  - 2.1 Commands
  - 2.2 Shells csh, ksh, bash
  - 2.3 Text editors-vi, Pico
  - 2.4 File system of Linux
  - 2.5 Directories and their special purpose
- 3. Installation of Linux** **3 hrs**
  - 3.1 Partitioning
  - 3.2 Installation of Linux
  - 3.3 Troubleshooting of installation
- 4. System Administration** **6 hrs**
  - 4.1 Root login
  - 4.2 Super user
  - 4.3 Configuration of hardware with kudzu
  - 4.4 Checking system space
  - 4.5 Monitoring system performance
  - 4.6 Working with file system
  - 4.7 Configuring modules
- 5. User Management** **6 hrs**
  - 5.1 Creating user accounts
  - 5.2 Setting user defaults
  - 5.3 Providing support to users
  - 5.4 Modifying accounts
  - 5.5 Deleting user accounts
  - 5.6 Checking disk quotas



5.7 Sending mail to all users	
<b>6. Security and System Handling</b>	<b>6 hrs</b>
6.1 Understanding shell scripts	
6.2 System start up and shutdown	
6.3 Scheduling system tasks	
6.4 Backing up and restoring	
6.5 Password protection	
6.6 File security	
<b>7. Setting up a Web Server</b>	<b>4 hrs</b>
7.1 Introduction to web server	
7.2 Starting the Apache web server	
7.3 Configuring the Apache server	
7.4 Monitoring server activities	
<b>8. Setting up DHCP and NIS</b>	<b>5 hrs</b>
8.1 Introduction to DHCP	
8.2 Setting up DHCP server	
8.3 Setting up DHCP client	
8.4 Understand NIS	
<b>9. Setting up a Database Server</b>	<b>5 hrs</b>
9.1 Configuring database server	
9.2 Checking the status	
9.3 Working with database	
<b>10. Setting up DNS Server</b>	<b>4 hrs</b>
10.1 Introduction to DNS	
10.2 Setting up DNS and configuration	
10.3 Querying DNS	
<b>11. ISP Simulation</b>	<b>2 hrs</b>
Integration of Servers; DNS, Web, Email etc	

#### **List of Practical:**

1. Linux utilities
2. OS installation project work.
3. User management using terminal
4. Security level Access control list.
5. Network setting.
6. Server configuration of DHCP, DNS, database server
7. Demonstration of web/mail/ file server.

#### **Text Book:**

Christopher Negus: Red Hat Linux 8.0, Bible, WILEY

#### **References:**

1. Neil Jenkins and Stanschatt: *Understanding Local Area Networks*, PHI
2. Andrew S. Tanenbaum: *Computer Networks*, PHI





## Organization Management (3 – 0 - 0)

### Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

### Course Objectives:

This course enables the students to achieve the management skills at professional level and to achieve the goal of organization through it with the help of use of technology.

### Course Contents:

#### 1. Introduction

8 hrs

- 1.1 Concept of management
- 1.2 Functions of management
- 1.3 Levels of management
- 1.4 Scope and application of management
- 1.5 Concept of organization
- 1.6 Characteristics of organization
- 1.7 Culture of organization
- 1.8 Formal and informal organizations
- 1.9 Organization chart
- 1.10 Types of organization-line: Line and staff, Functional and matrix
- 1.11 Authority and responsibility and their interrelationships.
- 1.12 Relationship between organization and management

#### 2. Motivation

8 hrs

- 2.1 Concept of motivation
- 2.2 Need of motivation
- 2.3 Financial and non financial motivation
- 2.4 Theories of motivation: Maslow Need hierarchy; Alderfer's ERG theory, McClelland's theory of learned needs, McGregor theory X and Y
- 2.5 Contemporary issues of motivation in Nepalese organization
- 2.6 Application of case

#### 3. Leadership

9 hrs

- 3.1 Concept of leadership
- 3.2 Need and importance of leadership
- 3.3 Qualities of effective leadership
- 3.4 Theory of leadership: trait theory, behavioral theory, transactional theory, transformational theory, charismatic theory
- 3.5 Leadership styles: Participative management, Management by objectives, management by exception.
- 3.6 Contemporary issue of leadership in Nepali organizations
- 3.7 Application of case

#### 4. Introduction to Industrial Relations

9 hrs

- 4.1 Meaning and nature of Industrial Relations





- 4.2 Objective of IR
- 4.3 Concept of grievance
- 4.4 Causes and settlement of grievances
- 4.5 Grievance settlement process in Nepal
- 4.6 Trade union
  - 4.6.1 Collective bargaining
  - 4.6.2 Trade union movement in Nepal
- 4.7 Employee discipline
- 4.8 Causes and settlement of disciplinary problem
- 4.9 Employee health and safety
- 4.10 Challenges of industrial relations in Nepal
- 4.11 Application of case

## **5. Contemporary issues in organizational management**

**14 hrs**

- 5.1 Human Resource Management
  - 5.1.1 Meaning and function of HR
  - 5.1.2 Job Analysis and Job Description
  - 5.1.3 Recruitment and Promotion
  - 5.1.4 Performance Appraisal
  - 5.1.5 Compensation management
  - 5.1.6 Training and development
  - 5.1.7 Role of HR professional in changing Environment
- 5.2 Globalization
  - 5.2.1 Introduction to Globalization
  - 5.2.2 Globalization and its effects to management and leadership
- 5.3 Corporate Social Responsibility
  - 5.3.1 Ethical Issue
  - 5.3.2 Issues on Employment Practices
  - 5.3.3 Human Rights
  - 5.3.4 Environmental Regulations
  - 5.3.5 Corruption
- 5.4 Conflict Management
  - 5.4.1 Conflicts and its sources
  - 5.4.2 Issues on settling conflicts
  - 5.4.3 Negotiation and Facilitation
  - 5.4.4 Mediation
  - 5.4.5 Arbitration
  - 5.4.6 Legal Action

### **References:**

1. Harold Koontz and Heinz Weihrich: Essentials of Management
2. Goodinda Ram Agrawal: Organization and Management in Nepal.
3. C.B. Mamoria: Personnel Management
4. Fred Luthan: Organizational Behavior, McGraw Hill



## Fundamentals of Probability and Statistics (3 – 0 – 0)

### Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

### Course Objectives:

This course aims to provide students with a thorough understanding of descriptive and inferential statistical tools used in decision making.

### Course Contents:

- 1. Introduction** 3 hrs
  - 1.1 Statistics and data
  - 1.2 quantitative and categorical variables
  - 1.3 fundamental elements of a statistical analysis
- 2. Data collection** 4 hrs
  - 2.1 Sources of data
  - 2.2 experimental research
  - 2.3 survey research
  - 2.4 questionnaire
  - 2.5 data preparation - editing, coding, and transcribing
- 3. Tables and Charts** 4 hrs
  - 3.1 Steam-and-leaf display
  - 3.2 frequency distribution
  - 3.3 relative frequency distribution
  - 3.4 cumulative polygon
  - 3.5 time-plots
- 4. Summarizing and Describing Numerical Data** 5 hrs
  - 4.1 Measure of central tendency: mean, median, mode and mid-hinge
  - 4.2 Measures of variation: range, inter quartile range, standard deviations, and coefficient of variations.
  - 4.3 Shape
  - 4.4 five-number summary and box-and-whisker plot
- 5. Probability** 5 hrs
  - 5.1 Basic concepts
  - 5.2 counting rules
  - 5.3 objective and subjective probability
  - 5.4 marginal and joint probability
  - 5.5 addition rule
  - 5.6 conditional probability
  - 5.7 multiplication rules





5.8 Bayes' Theorem

- |                                                                    |              |
|--------------------------------------------------------------------|--------------|
| <b>6. Discrete Probability Distribution</b>                        | <b>5 hrs</b> |
| 6.1 Random variables                                               |              |
| 6.2 mean and standard deviation of discrete random variables       |              |
| 6.3 mathematical expectation                                       |              |
| 6.4 binomial distribution                                          |              |
| 6.5 Poisson distribution                                           |              |
| <b>7. Continuous Probability Distribution</b>                      | <b>5 hrs</b> |
| 7.1 Normal distribution and its applications                       |              |
| 7.2 assessing normality                                            |              |
| 7.3 normal approximation of binomial and Poisson distribution      |              |
| <b>8. Estimation of Population Parameters</b>                      | <b>5 hrs</b> |
| 8.1 Law of large numbers                                           |              |
| 8.2 central limit theorem                                          |              |
| 8.3 statistical confidence                                         |              |
| 8.4 confidence intervals                                           |              |
| 8.5 confidence for means and populations                           |              |
| <b>9. Hypothesis Testing</b>                                       | <b>6 hrs</b> |
| 9.1 Testing of significance                                        |              |
| 9.2 p-value approach to hypothesis testing                         |              |
| 9.3 connection between confidence intervals and hypothesis testing |              |
| 9.4 comparing two means (two sample z and t- test procedures)      |              |
| 9.5 comparing two proportions                                      |              |
| <b>10. Correlation and Regression Analysis</b>                     | <b>6 hrs</b> |
| 10.1 Correlation Coefficient                                       |              |
| 10.2 Properties                                                    |              |
| 10.3 Simple Linear Regression Model                                |              |
| 10.4 Residual Analysis                                             |              |
| 10.5 Coefficient of Determination                                  |              |
| 10.6 Standard Error                                                |              |

**Text Books:**

1. Levin, Richard I. And David S. Rubin: *Statistics for Management*, Prentice-Hall of India
2. Berenson, Mark L. and David M. Levine: *Business Statistics: Concepts and Applications*, Prentice-Hall, Inc



## **Project III**

BCA, Third Year, Sixth Semester

### **Course Objectives:**

The goal of the project work is to provide the students an opportunity to experience the demands and solving real-world problems. During the course, students have to design and complete a functional project which should require integration of various course concepts based on any of the computer core areas covered in the syllabus or from the management areas subject to the approval of Project Committee. Students will develop various skills related to project management like team work, resource management, documentation and time management to develop effective and efficient software.

### **Project work need to be conducted based on following guidelines:**

#### **1. Group formation** (Not exceeding 4 persons per group)

#### **2. Proposal Defense**

The first stage is worth 10% of the grade and the grading shall be based on the following:

- ✓ Specification (Define the Problem)
- ✓ Project plan (Draw up a project plan identifying the different components)
- ✓ The overall budget.

#### **3. Development Stage (Work performed)**

The second stage is worth 50% of the overall grade which is evaluated as follows:

- ✓ System design (if applicable)
- ✓ Thoroughness of the work done
- ✓ Familiarity with other work in the field.
- ✓ Ability to critically evaluate work of others.
- ✓ Understanding of methods used in the project
- ✓ Amount of work performed
- ✓ Significance of the work performed
- ✓ Level of achievement with respect to the degree of difficulty
- ✓ Correctness
- ✓ Ability to identify problem areas and suggest appropriate solutions
- ✓ Ability to work with others
- ✓ Project management skills

#### **4. Reporting Stage**

##### **a. Documentation (20%)**

This criterion evaluates the final document presented. This includes the final project report including journals of the student's experiences during the project, the programmer's manual, the user's manual, the source code listings, and data used for program verification, validation and output. It consists of 20% of the total marks. In particular, the following points are evaluated:

- ✓ Report organization (systematic and logical)
- ✓ Text formatting style (clarity and conciseness)





- ✓ Completeness of the report
- ✓ Readability of manuals
- ✓ Readability of programs
- ✓ Organization and analysis of data and output

**b. Presentation 20%**

At the end of the semester the students will have to give a presentation. The students must present their work in the presence of external examiners (all students must attend all presentations). This criterion evaluates the ability of student in presenting his/her work to other people. It consists of 20% of the total marks. In particular, the following points are evaluated:

- ✓ Organization and smartness of appearance of presenters
- ✓ Delivery
- ✓ Clarity
- ✓ Content
- ✓ Ability to answer questions
- ✓ Demonstration of the system
- ✓ Application of audio-visual aids



**Web Technologies II (3-0-3)**  
**BCA, Third Year, Sixth Semester**

**Evaluation:**

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

**Course Objectives:**

The student would be able

1. To expose the students with client and server side web programming.
2. To know flexible but powerful languages for developing dynamic web pages.
3. To get practical knowledge of server side scripting languages like Servlet, JSP and PHP.
4. To help the students to understand the concept of HTML, Servlet, JSP and PHP.

**1 Web Essentials: Clients, Servers, and Communication**

**4 hrs**

**1.1 Review of Web Technologies I**

Basic internet protocols, HTTP request message, HTTP response message, web clients, web servers

1.2 Different architectures of connection

1.3 Client side Vs server side scripting language

**2 Web-based scripting using PHP**

**12 hrs**

**2.1 Introduction to PHP**

Installation of Web Server, PHP Server Configurations; PHP MyAdmin, Writing simple PHP program, Arrays, Control statements, loops, User defined functions (with argument and return values), global variable, URL encoding, HTML Encoding

**2.2 PHP and Database connectivity**

Need for database, php supported database, Introduction to MySQL, CRUD - select statements, creating database/tables, inserting values, updating and deleting

**2.3 File handling in PHP**

Reading and writing from and to FILE, file system and directory functions

**2.4 More features of PHP**

Working with cookies and sessions, Sending email in php

**3 Java for Server Side Programming**

**12 hrs**

**3.1 Java Servlets**

Servlet architecture, servlet lifecycle, parameter data, session, cookies, url rewriting, data storage

**3.2 JSP technology**

Introduction to JSP, JSP and servlet, Database Access, Database Programming using JDBC Studying Javax.sql.\* package, Accessing a Database from a JSP Page

**4 Web-based frameworks**

**6 hrs**

4.1 Content Management Systems

4.2 Web-programming frameworks

4.2.1 Introduction to general web programming frameworks

4.2.2 Java frameworks





#### 4.2.3 PHP frame work

### 5 Web Services

4 hrs

5.1 Introduction to web services and service-oriented architecture

#### 5.2 SOAP

SOAP elements, RPC representation, SOAP encoding of struct data

5.3 WSDL

5.4 Concept of UDDI

5.5 RESTful web services

### 6 Security in web applications

7 hrs

#### 4.1 Web application security fundamentals

Foundations of security, threats, vulnerabilities, attacks, security principles

#### 4.2 Threats and countermeasures

Anatomy of attack, network threats and countermeasures, host threats and countermeasures, application threats and countermeasures, configuration managements

#### 4.3 Design guidelines for secure web applications

Architecture and design issues for web applications, deployment considerations, input validations, authentication, authorization, configuration management, sensitive data, session management, cryptography, parameter manipulation, exception management, auditing and logging

#### List of Practical:

1. Demonstrate use of variables, operators, conditional statements and looping constructs.
2. Demonstrate use of array
3. Design a web page with controls like text box, radio button, check box, combo box etc, and check field data and their validity.
4. Demonstrate reading and writing to a text file.
5. Design a web page which will help user to send an enquiry to site admin email account. (Hint: take users email id, subject, and body in suitable controls and a button).
6. Design a web page to develop applications using back-end tools

#### Text Books:

1. Jeffry C. Jackson-Web Technologies: A computer Science Perspective, Pearson
2. Steve Suehring, Tim Converse and Joyce park -PHP 6 and Mysql

#### References:

1. B M Harwani -Developing Web Applications in PHP and AJAX, McGraw Hill
2. Mark Curphey, Joel Scambray, Erik Olson and Michel Howard-Improving Web Application Security Threats and Countermeasures, Microsoft
3. N. P. Gopalan, J Aklandeswari- Web Technology: A Developer's Perspective, PHI
4. Uttam K. Roy- Web Technologies, Oxford University Press
5. Kognet Learning solution -Web Technologies Black Book, Dream tech publication



**E-Business (3-1-0)**  
(Semester VII)

**Evaluation:**

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

**Course Objectives:**

1. This course helps students to understand how business organizations are using e-commerce to run and enhance their business and trading activities.
2. After completion of this course learners are expected to familiar with the various business terms and activities like e-commerce, e-business, business models, e-marketing, e-advertisement, e-payment, e-security as well as and good management skill for modern business transaction.

Unit	Topic	Hours
<b>1</b>	<b>Introduction to E-Business:</b>	
	1.1 The origin of e-commerce (coverage of growth of network and internet, emerge of WWW etc.)	4
	1.2 Definition of electronic commerce	
	1.3 The Scope of Electronic Commerce	
	1.4 Traditional commerce V/S electronics commerce	
	1.5 Difference between e-commerce and e-business,	
	1.6 Advantages and disadvantages, application of e-business.	
<b>2</b>	<b>Business Models for E-commerce:</b>	
	2.1 Business model	8
	2.2 Type of e-commerce E-business model)	
	2.2.1 E-business Models based on the relationship of Transaction parties ( B2B, B2C, C2C, B2G, G2B, G2C etc.)	
	2.2.1.1 Characteristics of B2B and B2C, Advantages of B2B and B2C, summary of all types	
	2.2.2 E-business Models based on the relationship of Transaction Types ( Brokerage, Aggregator, Info-mediary, Community, Value Chain, Subscription, Manufacture, Advertising, Affiliate)	
	2.2.2.1 Characteristics and advantages of Brokerage model	
	2.2.2.2 Price discovery Mechanisms of Brokerage Model [(Auction:- English Auction, Dutch Auction, First-price sealed-bid Auction, Vickery Auction) , Reverse auction, market Exchange]	
	2.2.2.3 Types of Aggregator	
	2.2.2.4 Classification of Info-mediary, Community Structure, Necessary elements for the community model	
<b>3</b>	<b>Enabling Technologies of the World Wide Web</b>	
	3.1 World wide web, Internet client server application	6



3.2 Software Agents, Value of software agents in a Networked World, A typology of Agents, A panoramic overview of the different Agent Types,	
3.3 Automotive network exchange	
3.4 Intranet and Extranet, Intranet software, Considerations in Intranet Deployment, Application of Intranet and extranet, structure of extranet, Extranet products & services, Business Model of Extranet Application, managerial Issues, Architecture of the Internet,	
<b>4 E-Procurement</b>	2
4.1 Difference between purchase and procurement	
4.2 Market solution: sell-side, buy-side, and market place	
4.3 Integration of product catalogue	
4.4 Procurement service provider	
<b>5 E-Marketing, E-Advertisement and E-branding:</b>	7
5.1 Introduction, Function, Traditional marketing and e-marketing	
5.2 Online Marketing, advantages and disadvantage	
5.3 Guidelines to prepare the good website and maintaining a website	
5.4 Conduction online market research	
5.5 E-advertisement: various means of advertisement, market segment, Measuring the effectiveness of e-advertisement,	
5.6 E-branding: Elements of branding	
5.7 Marketing Strategies (permission-marketing strategies, brand-leveraging strategies, Affiliate-marketing strategies, Viral-marketing strategies,, Social media marketing, Content marketing)	
<b>6 E-Payment Systems:</b>	4
6.1 Introduction, Types of e-payment, Digital payment, Digital payment requirements, online payment categories, Digital token-based e-payment systems	
6.2 Classification of new payment systems	
6.3 Risk factor in E-payment system	
<b>7 E-Security Systems:</b>	4
7.1 Information security system, Security on Internet	
7.2 Network and website security risks	
7.3 Security incidents on the internet	
7.4 E-business risk management issues	
7.5 Enterprise-wide security Framework	
<b>8 e-Customer Relation Management, e-Supply chain, e-Strategy and knowledge Management</b>	10
<b>8.1 e-CRM</b>	
8.1.1 Introduction to CRM, E-CRM Solutions, E-CRM toolkit	
8.1.2 Typical Business touch-points	
8.1.3 Managing Customer value orientation and life cycle	
8.1.4 The Tree phases of CRM	
8.1.5 Customer life Cycle	
<b>8.2 e-SCM</b>	
8.2.1 Introduction to e-SCM, supply Chain, The New Way	

8.2.2 Objectives of Supply Chain management

8.2.3 SCM-The Strategic Advantage

8.2.4 e-Supply chain Components

8.2.5 e-Supply Chain Architecture

### **8.3 e-Strategy and Knowledge Management**

8.3.1 Introduction to Knowledge, knowledge management and e-SKM

8.3.2 Importance of knowledge management, Knowledge as a key Business Asset, Change in the Global Business Economy, Change in Business Application

8.3.3 Information and Strategy, Information Strategy Framework, Seven Dimensions of e-commerce strategy, The McKinsey 7S framework.

## **9 Contemporary Issues in E-business**

3

9.1 Intellectual property right like patent right, design, Trade mark, Copy right,

9.2 Electronic transaction/cyber law

9.3 Cross border legal issues

9.4 Ethical & Other Public Policy Issues

### **Case Study**

To get more practical exposure students are required to study and analyze any kind of business website.

### **Text Books:**

1. P.T. Joshep, “E-commerce” PHI, fourth Edition 2012

2. David Whiteley, “E-Commerce”, Tata McGraw Hill

### **References Books:**

1. Eframi Turban, Jae Lee, David King, K. Michale Chung, “Electronic Commerce”, Pearson Education

2. KalaKota & Whinston, “Frontiers of E-commerce”, Pearson

3. Daniel Amor, “Yje –E-business Revolution”, Pearson

## Java Programming (3-0-3) (Semester VII)

### Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

### Course Objectives:

1. To enable the students to understand the core principles of the Java Language.
2. To use visual tools to produce well designed, effective applications and applets.
3. To enable students to learn to produce well designed, effective standalone applications.
4. To enable students to do socket programming, database handling using JDBC

Unit	Topic	Hours
<b>1</b>	<b>Introduction to Core Java</b>	
	1.1 History of java, platform independency	7
	1.2 Introduction to JVM architecture	
	1.3 Object Oriented features with respect to Java	
	1.4 Class and Object	
	1.5 Operators, data types, arrays	
	1.6 Inheritance, Interfaces, Packages	
	1.7 Exception Handling	
<b>2</b>	<b>Applet As Java Applications</b>	
	2.1 Introduction to application	4
	2.2 Lifecycle of Applets	
	2.3 Applets and its methods	
	2.4 Applet Vs Applications	
<b>3</b>	<b>Multithreading</b>	
	3.1 Introduction to thread	4
	3.2 Multithreading concepts	
	3.3 Thread Life cycle	
	3.4 Creating multithreaded application	
	3.5 Thread priorities	
	3.6 Thread synchronization	
<b>4</b>	<b>Java Input Output</b>	5
	4.1 Java IO package	
	4.2 Byte/Character Stream	
	4.3 Buffered reader / writer	
	4.4 File reader / writer	
	4.5 Print writer	
	4.6 File Sequential / Random	
<b>5</b>	<b>Java GUI Components</b>	
	5.1 Containers, Frames and Panels	10
	5.2 Layout manager	

5.3	Introduction to Netbeans IDE	
5.4	Event delegation Model, Event source and handler, Event categories, Listeners, interfaces, adaptor classes	
5.5	Swing Libraries, Model view Controller design pattern Different layout and All swing components	
<b>6</b>	<b>Networking with Java</b>	<b>6</b>
6.1	Networking basics	
6.1.1	Sockets, port	
6.1.2	Proxy servers	
6.1.3	Internet addressing URL	
6.2	java.net – Networking classes and Interfaces	
6.3	Implementing TCP/IP based Server and Client	
6.4	Datagrams – Datagram packet, Datagram server and client	
6.5	URL connections	
<b>7</b>	<b>JDBC</b>	<b>6</b>
7.1	Java database connectivity, Types of JDBC drivers	
7.2	Writing first JDBC applications	
7.3	Types of statement objects (Statement, PreparedStatement and CallableStatement)	
7.4	Types of resultset, ResultSetMetadata	
7.5	CRUD operations in database	
7.6	JDBC and AWT	
7.7	Connection pooling	
<b>8</b>	<b>Generics</b>	<b>6</b>
8.1	Introduction to generics	
8.2	Generics class with parameters	
8.3	General form of a generic class	
8.4	Creating a generic method, constructors, interfaces	
8.5	Polymorphism in generics	

## Laboratory

1. Demonstrate uses of arrays, operators.
2. Write a java code to demonstrate inheritance, multilevel inheritance, multiple inheritance using interfaces, creation and use of own packages.
3. Demonstrate exception handling (try-catch-finally, throws etc).
4. Create an Applet and embedded it in HTML page.
5. Demonstrate multi-threading
6. Demonstrate sequential and random reading and writing of files
7. Design AWT/Swing form with all swing controls.
8. Demonstrate TCP and UDP based client server connection.
9. Demonstrate CRUD operations of database with help of AWT/Swing controls
10. Demonstrate use of generic method, constructors and interfaces

**Text Book**

1. Herbert Schildt, Java The Complete Reference, Tata McGraw Hill Edition

**Reference Books**

1. Kogent, Java 6 Programming Black Book, Dreamtech Publication
2. Cay S Horstmann, Fary Cornell Core Java 2 Volume – I, Sun Microsystem press
3. Cay S Horstmann, Fary Cornell Core Java 2 Volume – II, Sun Microsystem press
4. E.Balguruswami Programming with Java, A Primer, Tata McGraw Hill Edition

## **Simulation and Modeling (3 – 1 – 3)**

### **Evaluation:**

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

### **Course Objective:**

- To introduce the details of modeling and simulation technologies to the students.
- To provide the students with the knowledge of discrete and continuous systems, generation of random variables, and analysis of simulation output and simulation languages.

### **Course Contents:**

#### **1. Introduction to Modeling and Simulation**

**4 hrs**

- 1.1 System concept
- 1.2 System Environment
- 1.3 Stochastic Activities
- 1.4 Continuous and Discrete System
- 1.5 System Modeling
- 1.6 Types of Models
- 1.7 Principles of Modeling
- 1.8 Area of application
- 1.9 Verification and Validation of model

#### **2. System Simulation**

**8 hrs**

- 2.1 The Techniques of Simulation-Monte Carlo Method
- 2.2 Problems Depicting Monte Carlo Method
- 2.3 Comparison of simulation and analytical methods
- 2.4 Experimental nature of simulation
- 2.5 Types of system simulation
- 2.6 Distributed Lag Models
- 2.7 Cobweb Models
- 2.8 Steps of Simulation Study
- 2.9 Time advancement Mechanism
- 2.10 Queuing Models and its Characteristics
- 2.11 Queuing Discipline
- 2.12 Measures of queues, Single Server Queuing System

#### **3. Continuous System**

**8 hrs**

- 3.1 Continuous system simulation and system dynamics
- 3.2 Continuous system models
- 3.3 Differential equations-Linear differential equation
- 3.4 Non linear differential equation

- 3.5 Partial differential equation
- 3.6 Analog computers
- 3.7 Components of analog computers
- 3.8 Analog methods
- 3.9 Hybrid computers
- 3.10 Digital analog simulators
- 3.11 Continuous system simulation language
- 3.12 CSMP III
  - 3.12.1 Structure Statements
  - 3.12.2 Data Statements
  - 3.12.3 Control Statements
  - 3.12.4 Hybrid Statements
- 3.13 Feedback System
- 3.14 Interactive system
- 3.15 Real time simulation
- 3.16 Predator pray model

#### **4. Discrete System Simulation**

**8 hrs**

- 4.1 Discrete system simulation
- 4.2 Representation of time
- 4.3 Generation of arrival patterns
- 4.4 Simulation of telephone system
- 4.5 Gathering statistics
- 4.6 Counters and summary statistics
- 4.7 Measuring Utilization and Occupancy
- 4.8 Recording distribution and transit time
- 4.9 Discrete simulation languages

#### **5. Probability Concepts and Random Number Generation**

**5 hrs**

- 5.1 Probability concepts in simulation- Stochastic variable
- 5.2 Discrete Probability function
- 5.3 Continuous Probability function
- 5.4 Random numbers
- 5.5 Properties of random numbers
- 5.6 Pseudo random number
- 5.7 Technique for generation of random number
- 5.8 Test for Random number generation
  - 5.8.1 Uniformity test (K-S test and Chi-square test)
  - 5.8.2 Independence test (Runs test and Auto Correlation test)

#### **6. Simulation languages**

**6 hrs**

- 6.1 Types of simulation languages
- 6.2 Discrete systems modeling and simulation with GPSS
- 6.3 GPSS programs applications
- 6.4 SIMSCRIPT –Organization of a SIMSCRIPT program
- 6.5 SIMSCRIPT programs.

## **7. Analysis of Simulation Output**

**6 hrs**

- 7.1 Nature of the Problem
- 7.2 Estimation methods
- 7.3 Simulation run statistics
- 7.4 Replication of run
- 7.5 Elimination of Initial Bias

### **Laboratory:**

Develop a simulation model, the topic could be either initiated by the student or selected from a list provided by the instructor. An oral presentation with a demonstration should be part of the laboratory project report.

### **Text Books:**

1. G. Gordon, *System Simulation*, Prentice Hall of India.
2. A.M. Law and W.D. Kelton, *Simulation Modeling and Analysis*, McGraw Hill, 1991

### **References:**

1. J.A. Spriest and G.C. Vansteenkiste, *Computer-Aided Modeling and Simulation*, Academic Press.
2. A.M Law and R.F. Parry, *Simulation: A Problem-solving approach*, Addison Wesley Publishing Company.
3. Narsingh Deo, “*System Simulation with Digital Computer*”



## Mobile Application Development Technology (3-0-2)

### Evaluation:

	Theory	Practical	Total
Sessional	30	20	50
Final	50	-	50
Total	80	20	100

### Objectives:

1. To provide students with the knowledge of recent trends in mobile application development.
2. To give the overview of existing mobile operating systems and the development SDKs required to develop applications based on them.
3. To teach students the basics of application development with reference to Android environment.

### Course Contents:

- 1. Introduction to Mobile OSes** 7 hrs
  - 1.1 Introduction of Mobile OSes: Android, iOS, Ubuntu, Touch, Blackberry, Tizen, Firefox OS, Symbian, Windows Phone
  - 1.2 Build and Structures of Mobile OSes
  - 1.3 Introduction to development environment (Native v/s HTML5)
  - 1.4 Introduction to Android
    - 1.4.1 API levels/versions of Android
    - 1.4.2 Pros and Cons of Android
    - 1.4.3 Comparison of Android with other Mobile OSes
  - 1.5 Introduction to Android VM and Runtime (Dalvik and ART)
  - 1.6 Installation and configuration of Android SDKs and Eclipse IDE
    - 1.6.1 Their integration using ADT Plugin
    - 1.6.2 Running an emulator
  - 1.7 Using ADB command line interface
- 2. Java Architecture and OOPS** 4 hrs
  - 2.1 Java Classes and Objects
  - 2.2 Class Methods and Instances
  - 2.3 Inheritance and Polymorphism in Java
  - 2.4 Interface and Abstract Class
- 3. Android Classes and Basics** 9 hrs
  - 3.1 Android Fundamentals
    - 3.1.1 Creating an Android App,
    - 3.1.2 Android Manifests File
  - 3.2 The Activity Class
    - 3.2.1 Activity Lifecycle
    - 3.2.2 Extending the activity class
    - 3.2.3 Creating Default Activity
    - 3.2.4 Creating Splash and Login Activities
  - 3.3 The Intent Class
    - 3.3.1 Creating Intent
    - 3.3.2 Switching between Activities using Intent
  - 3.4 Permissions
    - 3.4.1 Allow APP permissions in Android Manifest



- 3.5 The Fragment Class and Its usage
4. **Android User Interface** 8 hrs
- 4.1. Introduction to Multiple Screen Size and Orientation Interfaces
- 4.2. User Interface Classes
- 4.3. Android XML Layouts, Resources and Styles
- 4.4. Android 3rd party UI/UX Libraries
5. **Advanced Topics** 6 hrs
- 5.1. User Notifications
- 5.2. The BroadcastReceiver class
- 5.3. Threads, AsyncTask and Handlers
- 5.4. Alarms
- 5.5. Networking
6. **Graphics and Multimedia** 6 hrs
- 6.1. Graphics and Animations
- 6.2. Multitouch and Gestures
- 6.3. Multimedia
7. **Packaging and Monetizing** 8 hrs
- 7.1 Data Management (using sqlite database, local storage)
- 7.2 The Content Provider Class
- 7.3 The Service Class
- 7.4 Google Mobile Ads SDK
- 7.5 Signing and Exporting an APP
- 7.6 Publishing your app to the Play Store

#### **Laboratory:**

The laboratory classes should be based on the topics covered in the lecture classes that should give the students a hands-on training and familiarize them with the development environment.

The Laboratory works should enable students to setup and run their own development environment and provide them with the base for their application development and publishing. It should also focus on publishing the application to the App Store and also monetize the apps using one of the advertising networks provided by the SDK.

#### **Text Books:**

1. Zigurd Mednieks, Liard Dornin, G.Blake Meike, Mausami Nakamura "Programming Android: Java Programming for the New Generation of Mobile Devices", 2<sup>nd</sup> Edition, O'Reilly 2012
2. Reto Meier, "Professional Android Application Development", Wiley Publishing Inc, 2009, ISBN: 978-0-470-34471-2

#### **Reference Book:**

1. Barry Burd, Android Application Development All-in-One For Dummies, John Wiley & Sons, Inc 2012.





## Management Information System (3-1-0)

### Evaluation:

	Theory	Practical	Total
Sessional	50	-	50
Final	50	-	50
Total	100	-	100

### Objectives:

1. To provide the basic knowledge of information and its application
2. To provide the conceptual knowledge of information system specially the use of MIS
3. To provide application of KDD for knowledge generation
4. To provide the concept of the knowledge management with the use of ICT.

### Course Description:

This course covers all of today's leading edge technologies explaining their relationship to organization and management and emphasize, how managers can and should be involved with system planning, development, and implementation. The course also presents several electronic commerce projects to provide students through a deep exploration of Internet-based electronic commerce functions such as ordering products, making travel arrangements, finding investment opportunities etc.

### Course Contents:

#### Unit 1: Information and System Concept

6 hrs

##### 1.1 Data and Information

- 1.1.1. Introduction
- 1.1.2 Difference between data and Information
- 1.1.3 Types of Information
- 1.1.4 Component/ Dimension of Information
- 1.1.5 Quality, Cost and value of Information
- 1.1.6 Organization Dimension of Information (Information Flow and granularity)

##### 1.2 System

- 1.2.1 System Concepts with general model
- 1.2.2 Elements of a system
- 1.2.3 Types of System
- 1.2.4 Subsystem
- 1.2.5 Feedback Control
- 1.2.6 Systems approach to organization
- 1.2.7 Application of System Concepts
- 1.2.8 Mini cases related to Feedback Control

##### 1.3 Information System

- 1.3.1 Introduction of IS
- 1.3.2 Components of Information System
  - 1.3.2.1 Types of Information System ( Office Information System, Transaction Processing System, Management Information System, Decision Support System, Integrated Information System etc.)

#### Unit 2: Management Information System

4 hrs

##### 2.1 Definitions

##### 2.2 Historical Development of MIS

##### 2.3 Characteristics of MIS

##### 2.4 Components of MIS



- 2.5 Advantages and Disadvantages of MIS
- 2.6 Role of MIS
- 2.7 Importance of MIS for Managers
- 2.8 Simple Case study

### **Unit 3: Strategic and Competitive Opportunities**

4 hrs

- 3.1 Introduction
- 3.2 Organizational Horse Power (OHP)
- 3.3 The Strategies for Increasing OHP
- 3.4 Selecting and Adopting Organizational Horsepower Strategies
- 3.5 Simple Case Study

### **Unit 4: Data warehouse and Data Mining**

8 hrs

- 4.1 Preview of Introduction to data, information, field, record, table, file, database, data repository and data warehouse, Database Management system, Types of data, Objectives of Data base approach, Data base system and Hierarchy
- 4.2 Knowledge discovery in database (KDD)
- 4.3 KDD process
- 4.4 Need for a data warehouse
- 4.5 Building a data warehouse
- 4.6 Data warehousing Terminologies
  - 4.6.1 OLTP and OLAP with differential table
  - 4.6.2 Data Mart
  - 4.6.3 Metadata
  - 4.6.4 Drill-down and Roll-up Analysis
  - 4.6.5 ROLAP and MOLAP
  - 4.6.6 Star and Snowflake Schemas
- 4.7 Data Mining
  - 4.7.1 Classification of Data Mining Algorithm
  - 4.7.2 Data Mining Techniques
- 4.8 Implementation of Data warehouse and Data Mining (Lab.)

### **Unit 5: Decision support system and Artificial Intelligence**

8 hrs

- 5.1 Concept of Decision support System (DSS)
- 5.2 Components of DSS
- 5.3 Phases of Decision Making Process
- 5.4 Types of DSS
  - 5.4.1 Group Decision Support System (GDSS)
    - 5.4.1.1 Phases of GDSS process
    - 5.4.1.2 Components of GDSS
  - 5.4.2 Geographical Information System
  - 5.4.3 Artificial Intelligence and types
    - 5.4.3.1 Expert System, Components of Expert System,
    - 5.4.3.2 Neural Networks
    - 5.4.3.3 Genetic Algorithms
    - 5.4.3.4 Intelligent Agent
  - 5.4.4 Combining IT Brainpower System
- 5.5 Executive Information and Support Systems
  - 5.5.1 Enterprise & Executive Information System Concept and Definition
  - 5.5.2 Information needs of Executives
  - 5.5.3 Characteristics and benefits of EIS
  - 5.5.4 Comparing and Integrating EIS and DSS
- 5.6 Case study





**Unit 6: Managing IT System** 3 hrs  
6.1 Managing Information  
6.2 Managing Information Technology  
6.3 Managing Knowledge

**Unit 7: Knowledge Management** 3 hrs  
7.1 Introduction  
7.2 Managing Knowledge and Knowledge worker  
7.3 Knowledge Management in E-business

**Unit 8: Legal and Ethical Issues** 2 hrs  
8.1 Ethical and Social Issues  
8.2 Ethics and Moral Dimension  
8.3 Management Challenges

**Unit 9: Implementation of Information system** 3 hrs  
9.1 Change Management  
9.2 Critical Success factors  
9.3 Advanced balanced Scored  
    9.3.1 Advanced Strategic foundations development  
    9.3.2 Advanced objective & strategy map development  
    9.3.3 Advanced performance management  
    9.3.4 Implementation & Visualization  
    9.3.5 Strategic initiative prioritization & management  
    9.3.6 Advanced scorecard alignment and Cascading  
    9.3.7 Dashboard  
9.3.8 Business analytics

**Unit 10: Future Trends in MIS** 3 hrs  
10.1 Trend and information  
10.2 Intellectual Computing (Speech Recognition, decision making)  
10.3 Technology and mobility  
10.4 Technology Challenges

**For more practical exposure students are required to fulfill following demonstrative activities.**

- Developing SQL Server Data warehouse from foodmart.mdb using DTS package (developing warehouse).
- Implement the ETL process and create the OLAP cubes. And also retrieve the data from the OLAP cubes using MDX Sample Application.
- Implement K-nearest neighbor technique to demonstrate prediction and analysis under XLMiner/SPSS.
- Implement Decision Tree algorithm to demonstrate the concept of classification using XLMiner/SPSS.

#### Reference Books

1. **Management Information Systems** by Stephen Haag, M Cummings, A Phillips, Tata McGraw Hill P. L., 6<sup>th</sup> Edition
2. **Management Information Systems** by P.T. Joseph, Sanjay Mohapatra, PHI,
3. **Management Information Systems** by Indrajit Chatterjee, PHI,
4. **Management Information Systems** by C.S.V. Murthy, Himalayan Publishing House
5. **Information Technology for Management** by Efraim Turban, Linda Volonino, 7<sup>th</sup> Edition

