

**DETAIL SYLLABI  
OF  
COMPUTER SCIENCE AND ENGINEERING  
(THIRD SEMESTER TO EIGHTH SEMESTER)  
DEGREE (B.E.)**

**TRIPURA UNIVERSITY  
SURYAMANINAGAR**

**DETAIL SYLLABI OF COMPUTER SCIENCE AND ENGINEERING  
(Third Semester to Eighth Semester)**

**THIRD SEMESTER**

Sl. No.	Name of Subjects	Code No	Periods/ Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	<b>Engg. Mathematics - III</b>	BE/M-301	3	1	0	100	3
02.	<b>Computer Organization &amp; Architecture</b>	BE/CS-301	4	0	0	100	4
03.	<b>Data structures</b>	BE/CS-302	4	0	0	100	4
04.	<b>Programming in C</b>	BE/CS-303	3	1	0	100	3
05.	<b>Electronic Devices &amp; Circuits</b>	BE/ETC-302	3	1	0	100	3
06.	<b>Digital Electronics</b>	BE/ETC-303	3	1	0	100	3
<b>Practical / Sessional</b>							
07.	Digital Electronics Lab	BE/ETC-304	0	0	3	100	2
08.	Electronic Devices & Circuits lab	BE/ETC-307	0	0	3	100	2
09.	C Programming Lab	BE/CS-304	0	0	3	100	2
10.	Data structures Lab	BE/CS-305	0	0	4	100	2
<b>Total</b>			36			1000	28

(N.B. "L" for "Lecture", "T" for "Tutorial" and "P/S for "Practical / Sessional")

**FOURTH SEMESTER**

Sl. No.	Name of Subjects	Code No	Periods/ Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	Engg. Mathematics – IV	BE/M-401	3	1	0	100	3
02.	Engineering Economics and costing	BE/HU-402	3	1	0	100	3
03.	Object Oriented Programming	BE/CS-401	4	0	0	100	4
04.	Discrete Mathematics	BE/CS-402	3	1	0	100	3
05.	Operating System	BE/CS-403	3	1	0	100	3
06.	Microprocessor and Microcontroller	BE/ETC-404	4	0	0	100	4
<b>Practical / Sessional</b>							
07.	Microprocessor and Microcontroller Lab	BE/ETC-405	0	0	3	100	2
08.	Visual Basic Programming lab	BE/CS-404	0	0	4	100	2
09.	C++ Programming lab	BE/CS-405	0	0	3	100	2
10.	Operating System lab	BE/CS-406	0	0	3	100	2
<b>Total</b>			36			1000	28

**FIFTH SEMESTER**

Sl. No.	Name of Subjects	Code No	Periods/ Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	Theory of Computer Science & Automata	BE/CS-501	3	1	0	100	3
02.	Data Base Management System	BE/CS-502	4	0	0	100	4
03.	Computer Networks	BE/CS-503	4	0	0	100	4
04.	System Programming	BE/CS-504	3	1	0	100	3
05.	Advance Computer Architecture	BE/CS-505	3	1	0	100	3
06.	Communication Engineering	BE/ETC-506	3	1	0	100	3
<b>Practical / Sessional</b>							
07.	Java Programming Lab	BE/CS-507	0	0	3	100	2
08.	DBMS lab	BE/CS-508	0	0	3	100	2
09.	Computer Network Lab	BE/CS-509	0	0	3	100	2
10.	Communication engg. lab	BE/CS-510	0	0	3	100	2
<b>Total</b>			36			1000	28

**SIXTH SEMESTER**

Sl. No.	Name of Subjects	Code No	Periods/ Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	Design And Analysis Of Algorithm	BE/CS-601	4	0	0	100	4
02.	Compiler Design	BE/CS-602	4	0	0	100	4
03.	Computer Graphics	BE/CS-603	3	1	0	100	3
04.	Software Engineering	BE/CS-604	3	1	0	100	3
05.	Internet Technologies	BE/CS-605	3	1	0	100	3
06.	Control system Engineering	BE/EC-610	3	1	0	100	3
<b>Practical / Sessional</b>							
07.	Design and analysis of Algorithm	BE/CS-607	0	0	3	100	2
08.	Computer Graphics Lab	BE/CS-608	0	0	3	100	2
09.	Software Engineering Lab	BE/CS-609	0	0	3	100	2
10.	Control system Engg. Lab	BE/EC-611	0	0	3	100	2
<b>Total</b>			36			1000	28

## SEVENTH SEMESTER

Sl. No.	Name of Subjects	Code No	Periods/ Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	System Analysis & Design	BE/CS- 701	3	1	0	100	3
02.	Digital Image Processing	BE/CS - 702	4	0	0	100	4
03.	Artificial Intelligence & Soft Computing	BE/CS - 703	3	1	0	100	3
04.	Data Mining	BE/CS - 704	3	1	0	100	3
05.	Open Elective-I	BE/CS – 705	4	0	0	100	4
<b>Practical / Sessional</b>							
06.	Soft Computing Lab	BE/CS – 706	0	0	3	100	2
07.	Image Processing (Using MATLAB tools)	BE/CS – 707	0	0	3	100	2
08.	Web Technology Lab –I	BE/CS – 708	0	0	3	100	2
09.	Preliminaries of Project/ Thesis	BE/CS – 709	0	0	5	100	3
10.	Viva voce –I	BE/CS-710	0	0	0	50	1
11.	Professional Skill Development-I	BE/GP-2	0	0	2	50	1
<b>Total</b>			36			1000	28

**OPEN ELECTIVE-I: -      i) Network Security                      ii) ERP & E-Commerce**  
**iii) Advanced Microprocessor                      iv) Information Theory & Coding**

## EIGHTH SEMESTER

Sl. No.	Name of Subjects	Code No	Periods/ Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	Mobile Computing	BE/CS - 801	3	1	0	100	3
02.	Distributed System	BE/CS - 802	4	0	0	100	4
03.	Neural Network & Fuzzy Logic	BE/EC - 802	3	1	0	100	3
04.	Open Elective-II	BE/CS-803	3	1	0	100	3
05.	Industrial Management	BE/ME – 811	4	0	0	100	4
<b>Practical / Sessional</b>							
06.	Web Technology Lab –II	BE/CS – 806	0	0	3	100	2
07.	Advance Java Programming lab	BE/CS --807	0	0	3	100	2
08.	Case studies on Software design	BE/CS --808	0	0	3	100	2
09.	Project & Thesis	BE/CS – 809	0	0	5	100	3
10.	Viva voce-II	BE/CS – 810	0	0	0	50	1
11.	Professional Skill Development-II	BE/GP-3	0	0	2	50	1
<b>Total</b>			36			1000	28

**Open Electives:      i) Web Design & Multimedia                      ii) Parallel Processing**  
**(ii) Artificial Neural Network                      iv) Advanced Mobile Communication**

# SYLLABUS 3<sup>rd</sup> and 4<sup>th</sup> SEMESTER

**DETAIL SYLLABI OF COMPUTER SCIENCE AND ENGINEERING**

**THIRD SEMESTER**

Sl. No.	Name of Subjects	Code No	Periods/Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	Engg. Mathematics - III	BE/M-301	3	1	0	100	3
02.	Computer Organization & Architecture	BE/CS-301	4	0	0	100	4
03.	Data structures	BE/CS-302	4	0	0	100	4
04.	Programming in C	BE/CS-303	3	1	0	100	3
05.	Electronic Devices & Circuits	BE/ETC-302	3	1	0	100	3
06.	Digital Electronics	BE/ETC-303	3	1	0	100	3
<b>Practical / Sessional</b>							
07.	Digital Electronics Lab	BE/ETC-304	0	0	3	100	2
08.	Electronic Devices & Circuits lab	BE/ETC-307	0	0	3	100	2
09.	C Programming Lab	BE/CS-304	0	0	3	100	2
10.	Data structures Lab	BE/CS-305	0	0	4	100	2
<b>Total</b>			36			1000	28

(N.B. "L" for "Lecture", "T" for "Tutorial" and "P/S for "Practical / Sessional")

## **MATHEMATICS-III** **(BE/M-301)**

Classical and Axiomatic construction of the theory of Probability, Conditional Probability and basic formulae, random variables, probability density function and probability distribution function, functions of a random variable. Standard univariate discrete and continuous distributions and their properties. Mathematical expectations, moments, moment generating function. Multivariate distributions, marginal and conditional distributions, conditional expectations.

Fourier Series, Half range Series.

Series solution of ordinary differential equation of second order. Ordinary points and regular singular points.

Methods of least squares and curve fitting.

Partial derivatives, Chain Rule, Differentiation of implicit functions, exact differentials. Tangent planes and normal. Maxima, Minima, and Saddle points. Simple problems in extrema of functions with constraints. Method of Lagrange multipliers.

Multiple- double and triple integrals. Jacobians and transformation of co-ordinates. Applications to areas, volumes, centre of pressure. Improper integrals. Test of convergence. Beta and Gamma functions.

Vector differentiation and Integration. Gradient, divergence and Curl-applications.

Functions of complex variable. Limits and Continuity Differentiations. Analytic functions. Cauchy-Riemann equations, Conjugate functions; application to two dimensional problems, Cauchy's Integral theorem; Taylor's and Laurent's expansions; Branch points Zeros, Poles, residues. Simple problems on contour integration.

### **RECOMMENDED TEXT BOOKS:**

1. Engineering Mathematics- Kreyszig
2. Engineering Mathematics- Agrawal
3. Engineering Mathematics- Das

# **COMPUTER ORGANIZATION & ARCHITECTURE**

## **(BE/CS-301)**

**FIRST HALF:-**Introduction, Brief history of Computers, Economic trends, underlying technologies, General organization of a digital computer, Computer functions, Interconnection Structure, Bus, Bus interconnection. Arithmetical Logic Unit: arithmetic and logic operations, arithmetic and logic operands, construction an arithmetic and logic unit, bit slice unit, IEEE standards for floating point number representation, truncation techniques. Processor organization, Register organization, the instruction cycle, Instruction Pipelining, Micro-operations, Control of the Processor, Instruction sequencing, Formats and its interpretation, Micro-program concepts, Control unit design, CPU design.

**SECOND HALF:-**Semiconductor, magnetic and optical memories(Primary, Secondary and tertiary storage),memory organization, virtual memory, cache memory and interleaved memory, CD ROM ,Static and Dynamic ROM Interrupt, interrupt generation, interrupt handling and interrupt service routine, exception, Concepts of I/O organization, Data transfer methods, Programmed I/O, DMA, Interrupt based transfer, I/O channels, I/O processors, Serial transmission and synchronization. Multiprogramming and time sharing, architecture classification, Parallel computers-classification Various terms associated with pipelining, pipelined data paths, pipelined control, pipeline hazards, pipeline implementations, instruction-level parallelism, Multiprocessors, Array processors, Vector processors.

References:

1. Computer Architecture & Organisation, Hayes J. P., TMH,
2. Computer Organisation, Hamacher
3. Computer Organization and System Software, EXCEL BOOKS
4. Computer Organisation & Design, Chaudhuri P. Pal, PHI
5. Computer System Architecture, Mano, M.M., PHI.
6. System Architecture, Burd- Vikas

## **DATA STRUCTURE**

### **(BE/CS-302)**

#### **FIRST HALF**

**INTRODUCTION:**

Data Structure Definition, Survey of different types of data structure.

**ARRAYS:**

Representation of arrays, Ordered bits and their arrays, Sparse Representation.

**STACKS AND QUEUES:**

Fundamental of stacks and queues , Representation with arrays, circular queue, Multiple stacks and queues dynamics.



## LINK LISTS:

Singly linked list and their manipulation, storage pool , linked list, Dynamic storage management, Garbage collection, generalized list, Linked stacks and queues.

## SECOND HALF

## TREES:

Binary trees and its representation arrays, Linked binary tree traversal, Threaded binary tree, Binary tree representation of tree.

## SORTING AND SEARCHING:

Searching – linear and binary search , different algorithms for sorting and merging.

## SYMBOL TABLES:

Static tree tables, Dynamic tree tables, Hashing techniques for symbol table organization.

Interrelationship of Data Structure and algorithms.

## RECOMMENDED BOOKS:

1. An Introduction To Data Structures With Applications, Tremblay J.P. and Spreason P.J , Tata Mcgraw Hill
2. ‘Fundamentals Of Data Structures’ , Horowitz S. and Sahani S. , Computer Science Press.

# **Programming in C ( BE/CS-303)**

## **FIRST HALF**

### **INTRODUCTION TO PROGRAMMING**

Concept of program — Different programming languages & programming logic — Algorithms & Flow-charts

### **OVERVIEW OF C PROGRAMMING**

Introduction of C language — History of C — Importance of C — Demerits of C — Basic structure of C — Working steps of C Compiler — Source Code — Object code — Executable code

### **TYPES, OPERATORS & EXPRESSIONS**

Introduction (Grammars/Syntax Rules) — Character sets — Key words and Identifiers — Constants — Variables — Data types and Sizes — Declaration of variables — Different operators and expressions — Type conversions

### **MANAGING INPUT & OUTPUT OPERATIONS**

Analysis of some Input as well as Output functions: scanf ( ) – printf ( ) – getchar ( ) – putchar ( ) — Formatted Input and Output statements

## **CONTROL FLOW (DECISION MAKING)**

Decision making and branching — Simple and nested IF statements — IF-ELSE statements — CASE-SWITCH statements — Looping concept — GOTO statement — Looping: FOR, WHILE and DO-WHILE statements – Comparative study among them — BREAK and CONTINUE statements

## **ARRAYS**

One and two dimensional array — Array initialisation — Handling of character strings by using Array — Concatenation and comparisons of strings — String handling functions

## **SECOND HALF**

### **USER DEFINED FUNCTIONS**

Concept of user defined function — Difference between library function and user defined Function — Parameter passing technique — Calling a function — Category of function and their study — Nesting of functions and Recursions — Scope and lifetime of variables in functions

### **STRUCTURE & UNION**

Structure and Union — Declaration and initialisation — Array of structure

### **POINTERS**

Pointer declaration and accessing variables through pointers — Pointers and Arrays — Strings

### **FILE HANDLING IN C**

Different types of files — Command line arguments

### **Reference Books:-**

1. Let Us C by Yashwanth Kanetkar
2. Graphics Under C by Yashwanth Kanetkar
3. Kernighan, Brian W. & Ritchie, Dennis M., *The C Programming Language*. Second edition, 1988, Prentice Hall,
4. Programming with C by Byron Gottfried
5. ANSI C by E. Balaguruswamy.
6. C: How to Program, by H.M Deitel, P.J. Deitel, Harvey M. Deitel

## **Electronics Device and Circuits (BE/ETC-302)**

### **First Half**

#### **TRANSISTOR BIASING**

- 1.1 Concept of Q-point – AC and DC load line – Stabilization and stability factor
- 1.2 TYPES OF BIASING: (a) Base Bias, (b) Collector Feedback Bias, (c) Emitter Feedback Bias, (d) Potential Divider Bias.
- 1.3 Bias compensation circuits using diode and thermistors – FET biasing

## **SMALL SIGNAL TRANSISTOR AMPLIFIER**

- 2.1 Hybrid model and h-parameters of CB, CE & CC mode transistor amplifier – Calculation of voltage gain, current gain, power gain, input and output impedance in terms of h-parameters for RC coupled amplifier – Comparison of three configurations
- 2.2 Functional Characteristics and the operation of MOSFET and CMOS

## **RECTIFIER & Power Supply**

- 3.1 Half-wave and full-wave rectifier, average voltage, rms voltage, efficiency and ripple factor, percentage voltage regulation
- 3.2 Function of filter circuits: Capacitor input filter, inductive filter,  $\Pi$  type filter – Calculation of ripple factor and average output voltage – Function of bleeder resistor
- 3.3 Series and shunt regulator using transistor
- 3.4 Concept of switch mode power supply
- 3.5 Block schematic description of uninterrupted power supply.

## **SECOND HALF**

### **Module 1 OPERATIONAL AMPLIFIER**

- 4.1 Circuit operation of differential amplifier, single ended and double ended
- 4.2 Introduction to operational amplifier – Inverting and non inverting mode and their gain calculation – Common mode rejection ratio – Bias current – Offset voltage and current – Slew rate, open loop and closed loop gain – Input and output impedance – Frequency response and virtual ground
- 4.3 Applications of OPAMP as: Adder, Subtractor, Voltage Follower, Integrator, Differentiator, Comparator, Schmitt Trigger

### **Module 2 TIMER CIRCUITS**

- 5.1 Principle of operation of electronic timer
- 5.2 Functional description of internal blocks of timer IC555
- 5.3 Use of 555 timers in monostable and astable mode
- 5.4 Principle of operation of digital timer

## **REFERENCE BOOKS**

1. Electronic Principles / Malvino / Tata McGraw-Hill
2. Electronic Devices and Circuits / Boylestad & Nashalsky / Prentice Hall of India, N. Delhi
3. Electronic Devices and Circuits / S. Salivanan / Tata McGraw-Hill
4. Electronic Devices and Circuits / Mottershed / Prentice Hall of India, N. Delhi
5. Electronic Devices and Circuits / Millman & Halkias / Tata McGraw-Hill
6. Electronic Fundamentals and Applications / Chattopadhyay & Rakhshit / New Age International
7. Basic Electronic & Linear Circuits / Bhargava / Tata McGraw-Hill
8. Electronic Principle / Sahadeb / Dhanpat Rai & Sons

# **DIGITAL ELECTRONICS**

## **(BE/ETC-303)**

### **FIRST HALF**

#### **NUMBER SYSTEMS AND CODES :-**

Digital Systems : Number Systems- Binary, Decimal ,Octal and Hexadecimal.  
Number Base conversion, Complements, Binary Codes, Binary Logic.

#### **BOOLEAN ALGEBRA & LOGIC GATES:**

Basic Definitions : Axiomatic definition of Boolean algebra , basic theorems and properties of Boolean algebra, Boolean functions , canonical & standard forms , other logic operations , digital logic gates.

#### **SIMPLIFICATION OF BOOLEAN FUNCTIONS :**

The map method , sum of products simplification , product of sums simplification, don't care conditions, NAND and NOR implementations, The tabulation method, Determination of prime implicants, selection of prime-implicants.

#### **COMBINATIONAL LOGIC :**

Introduction, design procedure, Address, subtractor, multiplier and divider, Code conversion – analysis procedures, multilevel NAND and NOR circuits, Binary Parallel adder, magnitude comparator , decoders , multipliers , Read Only Memory (ROM), Programmable Logic Array (PLA)

### **SECOND HALF**

#### **SEQUENTIAL LOGIC:**

Introduction, flip- flops , triggering of flip flops, analysis of clocked sequential circuits, flip flop excitation tables, design procedures, design of counters, design with state equation, registers : shift register, ripple counter, synchronous counters , writing sequences, The memory unit, examples of random access memories.

#### **DIGITAL INTEGRATED CIRCUITS:**

Introduction to digital logic families, RTL and DTL circuits, integrated injection –logic , transistor logic, emitter coupled, Metal Oxide Semiconductor, complementary MOS.

### **A TO D & D TO A CONVERTERS:**

Study to different types of analog to digital and digital to analog converters , their resolution, conversion time, sensitivity, accuracy and other parameters.

### **BOOKS RECOMMENDED :**

1. M. Morris Mano, Digital Logic & Computer Design , PHI
2. T.C. Bartee, Digital Electronic Circuits, Mcgraw Hill Inc.
3. D.P. Malvino and Leach, Digital Electronics Principles, Mcgraw Hill Inc.
4. R.P. Jain Modern Digital Electronics.

### **DIGITAL ELECTRONICS LAB(BE/CS-304)**

#### **PRACTICALS:**

At least 10 practical to be done by the students covering the whole syllabus i.e. combinational circuits.Sequential circuits, DAC, ADC and logic families.

### **Electronics Device and Circuits LAB (BE/ETC-307)**

At least 10 practical to be done by the students covering the whole syllabus

### **DATA STRUCTURE LAB(BE/CS-304)**

#### **PRACTICALS:**

Use of various data structure available C language for solving no. of problems, may be simple mathematical problems based on the system programming.

Use and selection of appropriate data structures from the available data structures like- STACK, QUOUE, LINKED LISTS, DOUBLY LINKED LISTS, CIRCULAR QUEUES etc.

### **C PROGRAMMING LAB( BE/CS- 305)**

#### **PRACTICALS:**

At least Twenty (20) programs to be written & tested by running in computer covering theoretical syllabus in C (CSE- 302)

## **FOURTH SEMESTER**

Sl. No.	Name of Subjects	Code No	Periods/ Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	Engg. Mathematics – IV	BE/M-401	3	1	0	100	3
02.	Engineering Economics and costing	BE/HU-402	3	1	0	100	3
03.	Object Oriented Programming	BE/CS-401	4	0	0	100	4
04.	Discrete Mathematics	BE/CS-402	3	1	0	100	3
05.	Operating System	BE/CS-403	3	1	0	100	3
06.	Microprocessor and Microcontroller	BE/ETC-404	4	0	0	100	4
<b>Practical / Sessional</b>							
07.	Microprocessor and Microcontroller Lab	BE/ETC-405	0	0	3	100	2
08.	Visual Basic Programming lab	BE/CS-404	0	0	4	100	2
09.	C++ Programming lab	BE/CS-405	0	0	3	100	2
10.	Operating System lab	BE/CS-406	0	0	3	100	2
<b>Total</b>			36			1000	28

# **ENGG. MATHEMATICS –IV**

## **Code –BE/M-401**

### **FIRST HALF**

#### **Operation Research:-**

n-tuples of real nos, addition and scalar multiplication of vectors, Convex combination, Linearly dependence and independence, basic and dimension, Linear programming, concept of Simplex method, duality, two-phase method, Dual-Simplex, Transportation and assignment models.

#### **Numerical Analysis:-**

Solution of Algebraic and transcendental equation by bisection method, iteration method, Regular-Falsi ( False position) method, Newton-Raphson method, Complex roots by Lin-Bairstow method, Solution of simultaneous linear equation by Gauss Elimination and gauss –Seidal method.

### **SECOND HALF:-**

#### **Partial Differential equation:-**

Solution by separation of variables, Wave equation, heat equation, One and two dimension heat flow.

#### **Interpolation:-**

Concept of interpolation, Difference operators, Divided Difference interpolation, newton's forward, backward, interpolation, Lagrange's interpolation, Starling and Bessel's interpolation, numerical differentiation (1<sup>st</sup> and 2<sup>nd</sup> order), Numerical integration ( Trapezoidal, Simpson's one-third, three-eight, Weddle's rule).

#### **Numerical Solution of ordinary Differential equation :-**

Taylor's method, Picard's method, Runge's method, Runge-kutta's method, Euler's method and Euler's modified method.

#### **RECOMMENDED TEXT BOOKS:**

1. Engineering Mathematics- Kreyszig
2. Engineering Mathematics- Agrawal
3. Engineering Mathematics- Das

# ENGINEERING ECONOMICS AND COSTING

## (CODE-BE/HU-402)

### FIRST HALF

**1.Introduction:** Definition of Economics, Subject matter, Scope and nature of Economics, Engineering Economics and its importance, Basic Concepts, Goods, utility, wealth, value, consumption, human wants.

**2. Demand and supply:** Concept Law and Elasticity, Determinant of elasticity, measurement of elasticity.

**3. The theory of production and cost:** Factors of production function, marginal products, Law of variable proportions, Returns to scale. Accounting cost and Economics costs.

**4Theory of Firm and Pricing in various market structures:** Meaning of market, determination of output , revenue and profit in perfect and imperfect competitions.

**5. National Income, Money and Banking , Inflation:** Concept of measurement of National income; Function of money, central Bank, its functions, balance sheet and essential of sound Banking. Meaning of inflation and deflation, methods of control.

**6. Economic Reforms, Growth and Development;** Rationale of Economic Reforms in India, Meaning of Growth and Development, Concept of Planning, Economic systems – Capitalism , Socialism and Mixed Economy,.

### SECOND HALF

**7. Double Entry System Of Book Keeping:** Journal and ledger, Cash Book. Practical problems.

**8. Final Accounts:** Trading account, profit and loss account, balance sheet. Practical Problems.

**9. Bank Reconciliation Statement:** Practical Problems.

**10.Manufacturing Account:** Practical Problems.

**11. Elements of cost:** Direct Materials, direct labour, direct expenses, overheads- production, office and administration, selling and distribution. Practical Problems.

**12. Machine Hour Rate and Labour Hour Rate:** Practical Problems.



**13. Maintenance Of Stores:** Bin Card, store ledger, LIFO, FIFO, simple and weighted average, standard cost method. practical problems.

**BOOKS RECOMMENDED:**

1. Cost Accountancy- by Bose and Das.
2. Cost Accountancy- by B . Banerjee.
3. Monetary and fiscal Economics – P. R Krishna Aiyer.
4. Industrial Organization and Engineering Economics- by T R Banga and S C Sharma.

**MICROPROCESSOR AND MICROCONTROLLER**  
**(BE/CS-404)**

**FIRST HALF**

Introduction to 8-bit Microprocessor and their Features.  
Introduction to 8085A CPU ,architecture-register organization, addressing modes and their features. Pin description and features and Reset Operation of 8085 Microprocessor. Software instruction set. Programming Model in Assembly Language of 8085 Microprocessor, 8085 Microprocessor based Simple Assembly Language Programming.  
Instruction cycle, machine cycle, Timing diagram, Bus Idle Machine Cycle & INA Machine Cycle.  
Hardware Interfacing: 8085 Microprocessor based Buffered System, Interfacing of memory, peripheral chips (IO mapped IO & Memory mapped IO).  
Interrupts of 8085 Microprocessor : Software Interrupts, Hardware Interrupts & Vectored Interrupts,  
Peripherals: 8255, 8155/ 8156, 8355 PPIs, 8251Usart and 8253/ 8254 Timer/ Counter and their Characteristics & Interfacing with the 8085 Microprocessor. Programming Techniques using PPI.  
Data Transfer Techniques :-Synchronous, Asynchronous, Interrupt driven and DMA Modes of Data Transfer Techniques.  
Interfacing Techniques of A/D and D/A converters with 8085 Microprocessor and Programming.

**SECOND HALF**

Introduction to 8051 Micro-controller, Internal Architecture:- Oscillator & Clock, Program Counter & Data Pointer, CPU Registers, Flag &PSW, Internal RAM & ROM, Input/ Output pins, Ports, Timer/ Counter, Serial Data Input/ Output.  
Interrupts :- Different Modes of Interrupts of 8051 Micro-controller.  
Interfacing Techniques of External Memory units, Peripheral Devices, Analog to Digital & Digital Converters with 8051 Micro-controller.  
Instruction Sets of 8051 Micro-controller, Programming Model, Assembler & Assembler Directives. Simple programming in Assembly Language of 8051 Micro-controller.

## BOOKS RECOMMENDED:

1. Microprocessor, Gaonkar.
2. Microprocessor, Leventhal.
3. Microprocessor & Microcomputer by B. Ram.
4. The 8051 Microcontroller by K. J. Ayala.

# **OPERATING SYSTEM**

## **(BE/CS-403)**

### First Half

#### 1. Introduction:

What is an Operating System, Function of Operating System, Operating System Structure: System Components, Operating System services, System Calls, System Program, System Structure, Virtual Machines.

#### 2. Processes:

Process concept, Process State, Process State Transitions, Process Control Block, Suspend & Resume of Process, Interrupt Processing, CPU Switch from Process to Process, Process Scheduling: Scheduling Queues, Schedulers, Context Switch, Operations on Processes, Cooperating Processes, Inter Process Communication.

#### 3. Process Synchronization:

The Critical-section Problem, Dekker's Algorithm, Synchronization Hardware, Semaphores, Producer-Consumer Relationship, Classic Problems of Synchronization, Critical Regions/Sections, Monitors, OS Synchronization.

#### 4. Deadlocks:

System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance & Banker's Algorithm, Deadlock Detection, Deadlock Recovery.

#### 5. Threads:

Single & Multithreading Models, Threading issues, Pthreads, Solaris 2 Threads, Window 2000 Threads, Linux Threads, Java Threads.

#### 6. CPU Scheduling:

Basic concepts, Scheduling Levels, Scheduling Criteria, Pre-emptive & Non-preemptive Scheduling, Scheduling Algorithms, Multiple-processor scheduling, Real Time Scheduling, Algorithm Evaluation, Process Scheduling Models.

## SECOND HALF

### 7. Memory Management:

Memory Organization, Storage Hierarchy, Storage Management Strategies, Swapping, Contiguous & Non Contiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging.

### 8. Virtual Memory:

Virtual Storage Management Strategies, Demand Paging, Process creation, Page Replacement, Strategies, Allocation of Frames, Thrashing, Operating-system Examples.

### 9. File-System Interface:

File Concepts, File Organization, Access Methods, Directory Structure, File-system Mounting, File Sharing, Protection.

### 10. File-System Implementation:

File-system Structure, File System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery.

### 11. Disk Scheduling:

Disk Structure, Disk Caching, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure, Disk Attachment, Stable-storage implementation, Tertiary- Storage Structure.

### 12. Protection:

Goals of Protection, Domain of Protection, Implementation of Access Matrix, Revocation of Access Rights, Capability-Based Systems, Language-based Protection.

### 13. Security:

The security Problem, User Authentication, Program Threats, System Threats, Securing Systems and Facilities, Intrusion Detection, Cryptography, Computer-Security Classifications.

## **Books:**

### **Prescribed Text Book(S)**

#### 1. Operating System Concepts

By: Abraham Silberschatz, Peter Baer Galvin & Greg Gagne.  
John & Wiley & Sons, Inc.

#### 2. Operating System

By: H M Deitel  
Pearson Education, LPE.

## Reference Books

1. Operating System Concepts  
By: P.S. Gill  
Firewall Media.
2. An Introduction to Operating System Concepts & Practice  
By: Pramod Chandra P Bhatt  
PHI Pvt Ltd.
3. An Introduction to Operating System  
NIIT  
PHI Pvt Ltd.

# **DISCRETE MATHEMATICS**

## **(BE/CS-402)**

### **First Half**

#### UNIT I                      PROPOSITIONAL CALCULUS

Propositions – Logical connectives – Compound propositions – Conditional and biconditional propositions – Truth tables – Tautologies and contradictions – Contrapositive – Logical equivalences and implications – DeMorgan's Laws - Normal forms – Principal conjunctive and disjunctive normal forms – Rules of inference – Arguments - Validity of arguments.

#### UNIT II                      PREDICATE CALCULUS

Predicates – Statement function – Variables – Free and bound variables – Quantifiers – Universe of discourse – Logical equivalences and implications for quantified statements – Theory of inference – The rules of universal specification and generalization – Validity of arguments.

#### UNIT III      SET THEORY

Basic concepts – Notations – Subset – Algebra of sets – The power set – Ordered pairs and Cartesian product – Relations on sets –Types of relations and their properties – Relational matrix and the graph of a relation – Partitions – Equivalence relations – Partial ordering – Poset – Hasse diagram – Lattices and their properties – Sublattices – Boolean algebra – Homomorphism.

#### UNIT IV      FUNCTIONS

Definitions of functions – Classification of functions –Type of functions - Examples – Composition of functions – Inverse functions – Binary and n-ary operations – Characteristic function of a set – Hashing functions – Recursive functions – Permutation functions.

## SECOND HALF

### UNIT V      GROUPS

Algebraic systems – Definitions – Examples – Properties – Semigroups – Monoids – Homomorphism – Sub semigroups and Submonoids - Cosets and Lagrange's theorem – Normal subgroups – Normal algebraic system with two binary operations - Codes and group codes – Basic notions of error correction - Error recovery in group codes.

### UNIT VI

Monoids and groups: Groups Semigroups and monoids Cyclic semigroups and submonoids, Subgroups and Cosets. Congruence relations on semigroups. Morphisms. Normal subgroups. Structure of Cyclic groups permutation groups, dihedral groups Elementary applications in coding theory.

### UNIT VII

Rings and Boolean algebra : Rings Subrings morphism of rings ideals and quotient rings. Euclidean domains Integral domains and fields Boolean Algebra direct product morphisms Boolean sub-algebra Boolean Rings Application of Boolean algebra in logic circuits and switching functions.

#### TEXT BOOKS

1. Trembly J.P and Manohar R, “Discrete Mathematical Structures with Applications to Computer Science”, Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 2003.
2. Ralph. P. Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Fourth Edition, Pearson Education Asia, Delhi, 2002.

#### REFERENCES

1. Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, “Discrete Mathematical Structures”, Fourth Indian reprint, Pearson Education Pvt Ltd., New Delhi, 2003.
2. Kenneth H.Rosen, “Discrete Mathematics and its Applications”, Fifth Edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2003.
3. Richard Johnsonbaugh, “Discrete Mathematics”, Fifth Edition, Pearson Education Asia, New Delhi, 2002.

Kolman B. Busby R. discrete Mathematical Structures for Computer Science, Prentice Hall Englewood Cliffs. 1987.

Sahni , S. Concepts in discrete Mathematics Fridley MN., Camelot Publ. Comp., 1981.

Schmidt G. Strohlein T. Relations Graphs Program, EATS Monograph on Theor. Comp. Sc. Vol. 29 Berlin Spinger 1993.

# **OBJECT ORIENTED PROGRAMMING**

## **(Code: BE/CS – 401)**

### **FIRST HALF**

- 1) Introduction to Object-Oriented Programming, including methodologies, programming techniques, Object-Oriented languages, object and large systems, data abstractions, encapsulation, traits of OOP.
- 2) Overview of C++ basic structures, including the Main() function, C++ data types, expressions and statements, standard Input/Output, control statements in C++, functions and scope, structure.
- 3) General overview of objects and classes, separate interface from Implementation, accessing of members, constructors, destructors, declaring Objects, friend function and friend class.

### **2<sup>nd</sup> Half**

- 4) General overview of inheritance, including base classes and derived classes, subclasses, public/protected/private inheritance, constructors and destructors in derived classes, and using member functions. Categories of inheritance, and abstract classes.
- 5) Polymorphism in C++, including dynamic binding, virtual functions, and abstract base classes
- 6) Exception handling in C++, including usage, try, throw and catch, exception Specification and processing unexpected exceptions.
- 7) Object-Oriented analysis and design, procedure oriented development tools, prototyping paradigm.

#### Relevant Books:

1. The C++ Programming language by Bjarne Stroustrup, Addison-Wesley
2. C++ programming By Robert Leffor
3. An introduction to Object Oriented Programming with C++ by Timthy Budd, Addison-Wesley
4. Object Oriented Programming with C++ by Balaguruswamy, Tata Mcgraw Hill
5. Kip R. Irvine, C++ and Object-Oriented Programming, Prentice Hall,

**SESSIONAL**

**Sessional Work for 4<sup>th</sup> Semester, Computer Sc. & Engg.**

**Visual Basic Programming lab(BE/CS-404)**

**Microprocessor Micro-Controller Laboratory (BE/ETCE-405)**

Hand on Practice of Programming using 8085 Microprocessor and 8051Micontroller based Systems and their Interfaces

**C++ Programming Lab(BE/CS-405)**

At least 30 programs based on theoretical topics covered in the class.

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**Operating System lab(BE/CS-406)**

Sessional works based on theoretical subject

**Seminar / Group Discussion (BE/CS-408)**

# **SYLLABUS FOR 5<sup>th</sup> AND 6<sup>th</sup> Semester**



## **FIFTH SEMESTER**

Sl. No.	Name of Subjects	Code No	Periods/ Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	Theory of Computer Science & Automata	BE/CS-501	3	1	0	100	3
02.	Data Base Management System	BE/CS-502	4	0	0	100	4
03.	Computer Networks	BE/CS-503	4	0	0	100	4
04.	System Programming	BE/CS-504	3	1	0	100	3
05.	Advance Computer Architecture	BE/CS-505	3	1	0	100	3
06.	Communication Engineering	BE/ETC-506	3	1	0	100	3
<b>Practical / Sessional</b>							
07.	Java Programming Lab	BE/CS-507	0	0	3	100	2
08.	DBMS lab	BE/CS-508	0	0	3	100	2
09.	Computer Network Lab	BE/CS-509	0	0	3	100	2
10.	Communication engg. lab	BE/CS-510	0	0	3	100	2
<b>Total</b>			37			1000	28

# **THEORY OF COMPUTER SCIENCE & AUTOMATA**

## **(BE/CS-501)**

### **FIRST HALF**

- 1. Introduction:** Introduction to language theory, tokens. Alphabets, definition of grammar Production rules, sentences, sentential forms, language definitions, derivations.
- 2. Regular languages :** Pumping Lemma of regular sets, Minimization of finite automata. Chomsky Hierarchy of languages.
- 3. Finite Automata :** Finite automaton, Deterministic, Non-Deterministic and equivalence. Transition diagrams, epsilon transitions, Equivalence of regular expressions and FA. Moore and Mealy machines.

### **SECOND HALF**

- 4. Context Free Language :** Relations between classes of languages, Context Free Grammar, Derivation trees, ambiguity simplification, Normal forms, applications.
- 5. Pushdown Automata :** Pushdown automata, definitions, context free languages, construction of PDA for simple CFLs, Linear bounded automata.
- 6. Turing machines :** Turing machines , Introduction to computability , Universal Turing Machines , Types of Turing Machines , Techniques for construction of Turing machines , Halting problem.

#### REFERENCES :

1. Theory of Computer Science by Mishra & Chandrasekharan
2. R. SIRONMONEY, Formal Languages and Automata, The Christian Literature Society, 1984.
3. Z. KOHAVI, Switching and Finite Automata Theory, TataMcGraw Hill, 1984.
4. E.V.KRISHNAMOORTHY , Introductory Theory of Computer Science, Affiliated East West

# **COMMUNICATION ENGINEERING (BE/ETCE – 506)**

## **FIRST HALF**

**INTRODUCTION** : Types and reasons for modulation. Transmitters, transmission channels and receivers.

**SPECTRAL ANALYSIS** : Review of Fourier Transform theory, energy, power, Parseval's theorem. Power spectral density functions (PSDF), Analog spectrum analysis. The auto correlation functions, relationship between the PSDF and the auto correlation functions, PSDF's of harmonic signals and uncorrelated (white) signals.

Review of signal transfer in linear systems, the ideal low pass filters and distortionless transmission, importance of channel bandwidth.

**SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS** Condition for distortion less transmission of signals through networks. Different types of distortion and their effect on the quality of output signals. Transmission of transient signals, distortion analysis.

**AMPLITUDE MODULATION**: Modulation principle and definitions, spectrum and power considerations, DSB,SSB, VSB and AM principles. Different type of modulator circuits, Transistorized modulation circuit, Square law modulator, collector modulator etc. Balanced modulator. Different circuits for generation of SSB and VSB.

**DEMODULATOR** Basic principle of coherent detections, Square law detectors, Average envelope and peak envelope detectors. Distortions Detector circuit design. Design problems.

**FREQUENCY AND PHASE MODULATION** Principles and definitions, Relationship between frequency and phase modulations. Phase and frequency deviations, Spectrum of FM signal, bandwidth considerations. Effect of modulation index on bandwidth, Narrow band and sideband FM and PM principles, Circuit for realization of FM and PM. Stereophonic FM Principle.

**DEMODULATION** Principle of demodulation: Different type of demodulator, discriminator, use of PLL etc.

## **SECOND HALF**

**RADIO TRANSMITTER** Basic block diagram of radio transmitter (AM and FM), Analysis of a practical circuit diagram used for medium power transmitter.

**RADIO RECEIVER** Basic block diagram of TRF, Super-heterodyne principle, its advantages. Mixer principle and circuit, AVC, Radio receiver measurement.

RANDOM VARIABLES AND PROCESSES: Statistical properties; Cumulative distribution functions. Probability density functions, Auto correlations, Stationary and ergodic processes, Poisson, Gaussian, Reyleigh functions. Some sources of noise in signals. Mathematical representation and frequency domain representation. Spectral components of noise, Power spectral density, effect of filtering of noise, Super position of noises, Mixing of noise. Quadrature component representation of noise, power spectral density Calculation of quadrature components. Noise band width.

NOISE PERFORMANCE OF ANALOG COMMUNICATION SYSTEMS: Signal-to-noise ratio in linear modulation, synchronous detection of DSB. Signal-to-noise ratio for AM and SSB, comparison of DSB, SSB and AM. Effect of noise in envelope and square law detection of AM, threshold effects in nonlinear detectors. Signal-to-noise ration for FM,SNR improvement using pre-emphasis and de-emphasis networks. FM threshold effects, noise clicks in FM system. Comparison of linear and exponential modulation system for additive white band-limited noise channels.

References:

1. Principles of Communication Systems, Taub & Schilling, TMH.
2. Modern Digital and Analog Communication Systems, B. P. Lathi, OUP
3. Communication System, Hykin, Wheeler
4. Electronic Communication System, Kenndy, TMH
5. Electronic Communication, Roody & Coolen, PHI
6. Digital Communications: Fundamental And Applications, Sklar, Pearson
7. Digital Communications, Prokias, MGH
8. Electronic Communication System Fundamentals through Advance, Wayne Tomasi, Pearson Education.

## **SYSTEM PROGRAMMING**

### **BE/CS-504**

#### **FIRST HALF**

#### **1. Machine Structure , Machine Language and Assembly Language:**

General approach to a new machine

**Machine Structure :** Memory , Registers, Data, Instructions Special features

**Machine Language :** Machine language Program without looping, Different addressing modes, Programs with looping

**Assembly Language:** Introduction, Examples of Assembly language programming, Assembly language programming using literal.

#### **2. Assemblers :**

General design procedures

**Design of Assembler :**Statement of problem, Data structure, Format of databases, Algorithm.

## SECOND HALF

### 3. **Macro Language and Macro processor:**

Macro Instructions

**Features of Macro facility:** Macro instruction arguments, Conditional macro expansion, Macro calls within Macros, Macro instructions defining macros

**Implementation:** Implementation of a restricted facility-A Two pass algorithm, A single pass algorithm, Implementation of macro call within macros, Implementation within an assembler.

### 4. **Loaders:**

**Loader schemes:** General loader scheme, Absolute loaders, Subroutine linkages, Relocating loaders, Direct linking loaders, Other loader schemes.

**Design of a direct linking loader:** Specification of the problem, Specification of data structures, Format of databases, Algorithm.

#### **References:**

1. System Programming by J.J. Donovan, Tata McGraw Hill.
2. System Software by L.L. Beck, Addison Wesley Longman.
3. System Programming and Operating Systems by D.M. Dhamdhere, Tata McGraw Hill.

## **DATABASE MANAGEMENT SYSTEM**

### **Paper: BE/CS-502**

## **FIRST HALF**

### 1. **An Overview of Database:**

Database, Database System, BBMS Components, Data Independence, Data Abstraction, DDL, DML, Data Dictionary, Data Integration, Database Access Method, Characteristics of the Database Approach, Advantages of Using a DBMS, Implications of the Database Approach.

### 2. **Database System Architecture:**

Data Models, Schemas, and Instances, DBMS Architecture, Data Independence, Database

Languages and Interfaces, Database System Environment, Classification of Database Management Systems.

**3. Data Model Using E-R Model & Object Model:**

High-Level Conceptual Data Models, Entity Types, Entity Sets, Attributes and Keys, Relationships, Relationship Types, Roles, and Structural Constraints, Weak Entity Types, Refining the E-R Design, ER Diagrams, Naming Conventions and Design Issues, Subclasses, Super Classes, Inheritance.

**4. File Organization:**

Secondary Storage Devices, Parallelizing Disk Access Using RAID Technology, Buffering of Blocks, Placing File Records on Disk, Operations on files, Files of Unordered Records (Heap Files), Files of ordered Records (Sorted Files), Hashing Techniques, Other Primary File Organizations. Types of Single-Level Ordered Index, Multilevel Indexes, Dynamics Multilevel Indexes Using B-Trees and B+ Trees, Indexes on Multiple Keys, Other Types of Indexes.

## **SECOND HALF**

**5. Relational Model:**

Relational Model Concepts, Relational Constraints and Relational Database Schemas, Update Operations and dealing with constraint violations, Basic Relational Algebra Operations, Additional Relational Operations, Relational Calculus, Tuple Calculus, Domain Calculus.

**6. Relational Database Standard:**

Data Definition, Constraints, Schema Changes in SQL, Basic Queries in SQL, Insert, Delete, and Update statements in SQL, Views (Virtual Tables) in SQL, Specifying General Constraints As Assertion, Additional Features of SQL.

**7. Normalization for Relational Database:**

Functional Dependencies, Normal Forms based on Primary Keys: 1NF, 2 NF, 3 NF....., Boyce-Codd Normal Form, Normalization through Synthesis, Normalization using Join Dependency.

**8. Database Design & Tuning:**

Database Design Process, Physical Database Design in Relational Databases, Database Tuning in Relational Systems.

**9. Database Recovery & Security:**

Transactions, Recovery Concepts, Transaction Recovery, System Recovery, Media Recovery, Recovery Technique, Recovery in Multi Database Systems, Database Security Issues, Access Control for Multilevel Security, Data Encryption.

### **Prescribed Text Book(S)**

1. Fundamentals of Database Systems

By: Ramez Elmasri & Shamkant B. Navathe

Pearson Education, LPE.

2. An Introduction to Database Systems

By: C J Date

Pearson Education, LPE.

3. An Introduction to Database Systems

By: Bipin C Desai

Golgotia Publications Pvt Ltd..

## **COMPUTER NETWORKS**

### **PAPER: BE/CS-503**

#### **FIRST HALF**

**1. INTRODUCTION:** Definition, goals, applications and classification of computer networks. Some well-known networks, Protocols and standards.

**2. NETWORK MODELS:** Layered Tasks, Internet Models, Direct and indirect interconnection, need for addressing and routing. Concept of subnet-structure and topology of subnet, circuit, message and packet switching.

**3. NETWORK ARCHITECTURE:** Layered architecture and protocol hierarchy. OSI Reference Model. Services and important functions of each layer. TCP/IP Model, Design issues of layers.

**4. BRIEF REVIEW OF PHYSICAL AND DATA LINK LAYERS :** Guided and Unguided media, Line Discipline, Flow control, Capacity utilization, Sliding Window, Stop & wait protocols, Error detection mechanism, VRC,LRC,CRC, Automatic Repeat Request(ARQ)- stop-and wait , go-back-n, selective repeat.

**5. NETWORK LAYER:** Need for Network layer , Connection-oriented and connectionless services Addressing: Internet address, classful address, subnetting, supernetting, Classless Addressing , Routing techniques –Static versus Dynamic Routing, flooding, Congestion control algorithms.

#### **SECOND HALF**

**6. HDLC, MAC Sub layers:** ALOHA, Slotted ALOHA, CSMA, CSMA/CD, Ethernet, Controlled Access techniques: Token Ring, FDDI. IEEE Standards ( 802.3 and 802.5)

**7. WIRELESS AND MOBILE NETWORKING:** IEEE 802.11, IEEE 802.16, BLUETOOTH and IEE 802.15. Ad-hoc networks. Cellular networks – GSM, CDMA

**8. ISDN, B-ISDN, FRAME RELAY AND ATM NETWORKS:** Concept of ISDN and B-ISDN. Review of the digitization status of the telephone network. X.25, Frame Relay and ATM-evolution, ATM layers, sub layers and their functions, ATM switch architecture.

**9. TRANSPORT LAYER:** Concepts and duties of the transport layer , process to process delivery: UDP and TCP

**10. OPTICAL NETWORKS:** An overview of optical networks.

### Recommended Books:

- 1.Data Communication and Networking, 4<sup>th</sup> Edition, McGrawhill, Forouzan.
2. A.Tanenbaum, “Computer Networks”, 4th Ed., Pearson Education Asia (LPE), 2003.
3. L.L. Peterson and B.S. Davie, “Computer Networks: A Systems Approach”, 2nd Ed., Morgan Kaufman, Harcourt Asia, 2000.
4. W. Stallings, “Data and Computer Communications”, 6th Ed., Pearson Education Asia (LPE), 2000.
5. F. Halsall, “Data Communications, Computer Networks and Open Systems”, 4th Ed., Pearson Education Asia (LPE), 1996.
6. L. Garcia and I. Widjaja, “Communication Networks: Fundamental Concepts and Key architectures”, Tata-McGraw-Hill Ed., 2000.
7. J.F. Kurose and K.W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education Asia (LPE), 2001.
8. L. Kleinrock, “Queueing Systems, Vol. 1: Theory”, John Wiley, 1975.
9. Bertsekas and R. Gallagar, “Data Networks”, 2nd Ed., PHI (EEE), 1988.
10. W. Stallings, “ISDN and Broadband ISDN with Frame Relay and ATM”, 4th Ed.

## **ADVANCED COMPUTER ARCHITECTURE** **Paper: BE/CS-505**

### FIRST HALF

#### 1. FUNDAMENTALS OF COMPUTER DESIGN

Introduction, The changing face of computing and the task of the computer designer, Technology trends; Cost, Price, and Their Trends; Measuring and Reporting Performance; Quantitative Principles of computer design

#### 2. INSTRUCTION SET PRINCIPLES AND EXAMPLES

Introduction, classifying instruction Set Architectures, Memory Addressing, Addressing modes for Signal Processing Type and Size of operands, Operands for Media and Signal Processing, Operations in the instruction Set, Operations for Media and Signal Processing, Instructions for Control Flow, Encoding an instruction set

#### 3 .INSTRUCTION-LEVEL PARALLELISM AND ITS DYMANIC EXPLOITATION



Instruction-Level Parallelism: Concept and challenges, Overcoming Data Hazards with Dynamic schedule, Dynamic Scheduling: Examples and Algorithm, Reducing Branch Costs with Dynamic Hardware Prediction, High-Performance Instruction Delivery, Taking Advantage of More ILP with Multiple issues, Hardware based Speculation, Studies of the limitations of ILP, Limitations on ILP for Realizable Processors, Putting It all together: The P6 Micro architecture, Another View: Thread-level parallelism

## SECOND HALF

### 4. INTRODUCTION TO PARALLEL PROCESSING:

Process of pipelining and parallel processing, application of parallel processing  
.Flynn's classification: SISD, SIMD, MISD, MIMD MACHINES: Basic structure, Interconnection structure (Mesh, Cube, Hypercube, Pyramids, butterfly networks)

### 5. ADVANCE PROCESSOR TECHNOLOGY:

Design space of processors, instruction sets, CISC scalar processor-MC68040, VAX 8600 and RISC processor—SPARC, Intel i860. superscalar RISC processor –IBM RISC system/6000, Vector and symbolic processor-Syboic 3600 Lisp, VLIW processor architecture and feature. Vector processing principles- instruction types, memory access schemes

### 6 . DATA FLOW ARCHITECTURE

Parallel programming environment, Principles of synchronization, shared variable program structure, synchronous and asynchronous message passing.

### References:

- 1.Computer Architecture and Organization : J.P HAYES.
2. Computer System Architecture : MARRIS MANO.
- 3.Computer Architecture and parallel processing: KAI HWANG and F.A BRIGGS.
- 4.Computer System Design and Architecture : V.P HEURING and H..F JORDON.
- 5.Computer Architecture : JOHN L. HENNESSY and DAVID A. PATTERSON.

## **SESSIONAL**

### **Java Programming (BE/CS- 507)**

Sessional works based on theoretical subject (BE/CS-401)

### **Database Management System (BE/CS-508)**

Sessional works based on theoretical subject (BE/CS-502)

### **Computer Network (BE/CS-509)**

Sessional works based on theoretical subject (BE/CS-503)

### **Communication Engg. (BE/CS- 510)**

Sessional works based on theoretical subject (BE/CS-506)

## SIXTH SEMESTER

Sl. No.	Name of Subjects	Code No	Periods/Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	Design And Analysis Of Algorithm	BE/CS-601	4	0	0	100	4
02.	Compiler Design	BE/CS-602	4	0	0	100	4
03.	Computer Graphics	BE/CS-603	3	1	0	100	3
04.	Software Engineering	BE/CS-604	3	1	0	100	3
05.	Internet Technology	BE/CS-605	3	1	0	100	3
06.	Control system Engineering	BE/EC-610	3	1	0	100	3
<b>Practical / Sessional</b>							
07.	Design and analysis of Algorithm	BE/CS-607	0	0	3	100	2
08.	Computer Graphics Lab	BE/CS-608	0	0	3	100	2
09.	Software Engineering Lab	BE/CS-609	0	0	3	100	2
10.	Control system Engg. Lab	BE/EC-611	0	0	3	100	2
Total			36			1000	28

# **DESIGN & ANALYSIS OF ALGORITHMS**

## **(BE\CS-601)**

### **FIRST HALF**

• Review of proof techniques • Basic algorithmic analysis: Asymptotic analysis of upper and average complexity bounds; best, average, and worst case behaviors; big-O, little-o,  $\Theta$ , and  $\emptyset$  notation; standard complexity classes; empirical measurements of performance; time and space tradeoffs in algorithms; using recurrence relations to analyze recursive algorithms • Fundamental algorithmic strategies: Brute-force; greedy; divide-and-conquer; backtracking; branch-and-bound; heuristics; pattern matching and string/text algorithms; numerical approximation • Graph and tree algorithms: Depth- and breadth-first traversals; shortest-path algorithms (Dijkstra's and Floyd's algorithms); transitive closure (Floyd's algorithm); minimum spanning tree (Prim's and Kruskal's algorithms); topological sort •

### **SECOND HALF**

Tractable and intractable problems, Uncomputable functions, The halting problem, Implications of uncomputability The complexity classes P and NP: Definition of the classes P and NP, NP-completeness (Cook's theorem), Standard NP-complete problems, Reduction techniques Advanced algorithmic analysis: Amortized analysis, Online and offline algorithms, Randomized algorithms, Dynamic programming, Combinatorial optimization

# COMPILER DESIGN

Paper : BE/CS-602

## FIRST HALF

### 1. **Introductory Concepts:**

**Compiler structure:** analysis-synthesis model of compilation, various phases of a Compiler, Cross compilers: Bootstrapping.

### 2. **Lexical Analysis:**

Interface with input, parser and symbol table, token, lexeme and patterns, difficulties in lexical analysis, error reporting, and implementation. Regular definition, Transition diagrams, LEX.

### 3. **Syntax analysis:** context free grammars, ambiguity, associativity, precedence, top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing, Bottom up parsing, operator precedence grammars, LR parsers (SLR, LALR, LR), YACC.

### 4. **Syntax Directed Translation:**

Inherited and synthesized attributes, dependency graph, evaluation order, bottom up and top down evaluation of attributes, L- and S-attributed definitions.

## SECOND HALF

### 5. **Type checking:**

Type system, type expressions, structural and name equivalence of types, type conversion, overloaded functions and operators, polymorphic functions.

### 6. **Run time system:**

Storage organization, activation tree, activation record, parameter passing, symbol table, dynamic storage allocation.

### 7. **Intermediate Code Generation :**

Intermediate representations, translation of declarations, assignments, and Intermediate Code generation for control flow, Boolean expressions, and procedure calls, implementation issues.

### 8. **Code generation and instruction selection:**

Issues, basic blocks and flow graphs, register allocation, code generation, DAG representation of programs, code generation from dags, peep hole optimization, code generator generators, specifications of machine.

### **9. Code Optimization :**

Source of optimizations, optimization of basic blocks, loops, global dataflow analysis, solution to iterative dataflow equations, Code improving transformations, dealing with aliases, data flow analysis of structured flow graphs.

### **References:**

1. Compilers: Principles, Techniques, and Tools by Aho Ullman and Shetty, Pearson Education.
2. Compiler Construction: Principles and Practice by Kenneth C. Louden, Thomson Books/Cole –Vikas Publishing House.
3. Compiler Design in C by Alen I .Holub, Prentice Hall of India.

## **COMPUTER GRAPHICS**

**Paper: BE/CS-603**

### FIRST HALF

#### **1. Development of Computer Graphics:**

Basic graphics systems and standards. Raster Scan and random Scan graphics, Continual refresh and Storage displays, display processors, Color display techniques, frame buffer and bit operations, concepts in raster graphics.

#### **2. Output Primitives:**

Points and lines, Line drawing algorithms, circle and ellipse/generation algorithms, Conic sections, Polynomials and Spline curve, polygon filling. Ant aliasing.

#### **3. Two Dimensional Geometric Transformation:**

Basic transformation, Matrix representations and homogeneous coordinates, composite transformations, Transformation between coordinates system, Transformation functions. Raster methods for transformations.

#### **4. Two Dimensional viewing:**

The viewing pipeline viewing coordinates reference frame, Window to view port coordinate transformation, Two-dimensional viewing function, clipping operations. Points, line. Polygon and character clipping.

### SECOND HALF

#### **5. Three Dimensional Concept:**

3-D representation and transformations, 3-D viewing, Algorithm for 3-D volumes, Fractal geometric method.

#### **6. Rendering:**

A simple illustration model, Determining surface normal, Determining the reflection vector, transparency, lights, colors and shading.

**7. Hidden lines and surfaces:** Back-face removal, depth comparisons, Z-Buffer algorithms, scan-line algorithms, floating horizon

**8. Computer animation:** Types of animation, animation language, methods of controlling animation

**9.** Brief Introduction to Graphic Processors. Introduction to Graphical Input Devices and Input Handling Algorithms.

**References:**

- 1.Principle of interactive computer graphics by Newman & Sprout, McGraw Hill. I.E.
- 2.Procedural Elements for computer graphics by D.F.Rogers, McGraw Hill, I.E.
- 3.Computer graphics by Hearn & Baker, 2<sup>nd</sup> Edition PHL Ltd.

## **SOFTWARE ENGINEERING**

**Paper: BE/CS- 604**

### **FIRST HALF**

- 1. Software and Software Engineering:** How Software Engineering is an Engineering discipline? The Importance of Software, An Industry Perspective Software Characteristic, Software Components, Software Applications, Software Crisis, Software Myths.  
Computer Based System Engineering (CBSE), System Engineering Elements, Abstract functional requirements for CBSE.
- 2. Software Engineering Paradigm:** A Definition, Lifecycle Concept, Software Development Process Models, Fourth Generation Techniques.
- 3. Software Development:** Identification of Need, Feasibility study, SA/SD approach, Data Flow and Logical Data modeling, User Interface Design.
- 4. Object Oriented Analysis & Design:** Conventional vs. OO approaches, A unified approach to OOA. Domain analysis, OOA process. Design Issues, System Design Process, Object Design Process.

### **SECOND HALF**

- 1. Software Project Management:** Principles of Software Project Management, Team Structure & Scheduling, Project Planning, Project Initiation and Project Termination, Total Quality Management (TQM), Different Cost Estimation Methods, COCOMO Model, WBS, Configuration Management, Risk Management, Different Project Management Tools.
- 2. Software Testing Strategies:** Different Testing Verification & Validation, System Testing, The Art of Debugging, Proof of Correctness, Black Box Testing & White-Box testing,

Control Flow Graphs – Cyclomatic Complexity

**3. Software Quality Management:** Software Quality Factors, Quality Assurance, Quality Standards, Software Maintenance.

### **BOOKS & REFERENCES:**

1. *Software Engineering: a Practitioner's Approach (3rd Edition)* by Roger S Pressman, Tata McGraw Hill 1992.
2. *Software Engineering-Principles and Practice* by Jawadekar ,TataMcGraw Hill.
4. *Fundamentals of Software Engineering*, Ghezzi, P.H.I.
5. *Fundamentals of Software Engineering*, Rajib Mall, P.H.I.
6. *Software Fundamentals*, Daniel M. Hoffman & David M. Weiss, Addison Wesley.
7. *A Discipline for Software Engineering*, Watts S. Humphrey, Addison Wesley.
8. *Software Engineering: Theory & Practice*, Pfleeger, Addison Wesley.

### **INTERNET TECHNOLOGY**

Paper : BE/CS-605

#### **FIRST HALF**

1. The Internet: Brief history. Organization and architecture. Routing in the Internet Transport Layer in the Internet, Quality of Service (QOS): QOS requirements Internet.
2. Internet Application Layer: DNS, e-mail, SMTP, POP 3, MIME, World Wide Web & HTML Web design basic Client side programming Server side programming Web-enabled databases Web services,

#### **SECOND HALF**

3. .Different IP addressing schemes, Subneting, Superneting, Internet as Packet Switched Network, Internet as a connectionless network, Routing techniques, ARP,IP, ICMP, IPV6,UDP,TCP,client server model,
4. Security protocols in internet IP level security, Firewall, VPN, Attacks in the Internet, IP Spoofing, IP Sniffing, DNS Spoofing, IPsec,

#### **Reference Book:**

1. Data Communication and Networks, Forouzan, Mcgrawhill.
2. Cryptography and Network Security, Williuam Stallings, LPE
3. Cryptography and Network Security, Atul Kahate, PHI



# CONTROL SYSTEM ENGINEERING

## BE /EC – 610

### First Half

**Introduction to Control Systems:** Classification of control systems, Examples of control systems, Block diagram development of Physical systems, block diagram reduction and signal flow graph, Feedback Control Systems

**Properties of Control Systems:** Stability, steady-state & transient errors, disturbance rejection, insensitivity and robustness. Errors and Error constants, System types. Control system components: Potentiometer, tacho-generator, synchros & resolver, dc & ac servomotors, Amply dyne, Actuator Specification.

**Time response of system:** Transient & steady state response of second order system and ramp response of second order system, system response with additional poles and zeros, concept of dominant poles.

### Second Half

**Control actions:** Proportional, integral, derivative, and their combinations. Case Studies: Performance analysis of remote position control system and voltage regulator. Design and compensation of control systems in frequency domain: Frequency Domain Specifications in open loop and closed loop and their significance. Lag compensator, lead compensator and lag-lead compensator and Actuator design.

**Stability of linear systems:** Routh-Hurwitz criterion, Bode' Plot, Polar Plot, Nyquist criterion. Stability margins. Root locus. Effects of system gain on stability. Nichols chart. State variable analysis: Concept of state, state variable, state model. State variable formulation of control system, diagonalization, Relating transfer function with state model. Time response of state model of linear time-invariant system. Elementary concept of controllability & Observability, Conditions of Complete State Controllability and Observability.

References:

- 1) Control System Engineering, R. Ananda Natarajan & P. Ramesh Babu, Scitech, Chennai.
- 2) Kuo B.C. Automatic Control System, PHI
- 3) Das Gupta S : Control System Theory ; Khanna Pub.
- 4) Nagrath I J & Gopal M : Control Systems Engineering, New Age International Pub.
- 5) Ogata K : Modern Control Engg. PHI
- 6) Dorf R C & Bishop R.H.: Modern Control System ; Addison – Wisley
- 7) Bolton: Industrial Control & Instrumentation, Orient Longman
- 8) Nakra: Theory & Applications of Automatic Control, New Age International

- 9) Gopal: Modern Control System Theory, New Age International
- 10) Gopal: Digital Control Engineering, New Age International
- 11) Sinha: Control Systems, New Age International

### **Sessional**

**Design And Analysis Of Algorithm (BE/CS-607)**  
Sessional works based on theoretical subject (BE/CS-601)

**Computer Graphics (BE/CS- 608)**  
Sessional works based on theoretical subject (BE/CS-603)

**Software Engg. Lab(BE/CS-609)**  
Sessional works based on theoretical subject (BE/CS-604)

**Control System Engg. (BE/EC- 611)**  
Sessional works based on theoretical subject (BE/EC-610)

## SEVENTH SEMESTER

Sl. No.	Name of Subjects	Code No	Periods/Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	System Analysis & Design	BE/CS- 701	3	1	0	100	3
02.	Digital Image Processing	BE/CS - 702	4	0	0	100	4
03.	Artificial Intelligence & Soft Computing	BE/CS - 703	3	1	0	100	3
04.	Data Mining	BE/CS - 704	3	1	0	100	3
05.	Open Elective-I	BE/CS – 705	4	0	0	100	4
<b>Practical / Sessional</b>							
06.	Soft Computing Lab	BE/CS – 706	0	0	3	100	2
07.	Image Processing (Using MAT Lab tools)	BE/CS – 707	0	0	3	100	2
08.	Web Technology Lab –I	BE/CS – 708	0	0	3	100	2
09.	Preliminaries of Project/ Thesis	BE/CS – 709	0	0	5	100	3
10.	Viva voce –I	BE/CS-710	0	0	0	50	1
11.	Professional Skill Development-I	BE/GP-2	0	0	2	50	1
<b>Total</b>			36			1000	28

**OPEN ELECTIVE-I: - (i) Network Security ii) Advanced Microprocessor  
(iii) ERP & E-commerce**

# SYSTEM ANALYSIS & DESIGN

## (BE/CS- 701)

### First Half

#### Module 1

Data and Information – Types of information: operational, tactical, strategic and statutory – why do we need information systems – management structure – requirements of information at different levels of management – functional allocation of management – requirements of information for various functions – qualities of information – small case study

#### Module 2

Systems Analysis and Design Life Cycle: Requirements determination – requirements specifications – feasibility analysis – final specifications – hardware and software study – system design – system implementation – system evaluation – system modification. Role of systems analyst – attributes of a systems analyst – tools used in system analysis

#### Module 3

Information gathering – strategies – methods – case study – documenting study – system requirements specification – from narratives of requirements to classification of requirements as strategic, tactical, operational and statutory. Example case study

#### Module 4

Feasibility analysis – deciding project goals – examining alternative solutions – cost – benefit analysis – quantifications of costs and benefits – payback period – system proposal preparation for managements – parts and documentation of a proposal – tools for prototype creation . Tools for systems analysts – data flow diagrams – case study for use of DFD, good conventions – leveling of DFDs – leveling rules – logical and physical DFDs – software tools to create DFDs

### Second Half

#### Module 1

Structured systems analysis and design – procedure specifications in structured English – examples and cases – decision tables for complex logical specifications – specification oriented design vs procedure oriented design

#### Module 12

Control – audit and security of information systems – why controls are needed – objectives of control – techniques used in control – auditing information systems – auditing around, through and with the computer – testing information systems – types of tests – how to generate tests – security of information systems – disaster recovery – business process continuity

#### Module 3

Electronic data interchange – EDI standards – virtual private networks – XML and EDI. Security of e-commerce transactions, firewalls – encryption methods – symmetric and asymmetric encryption – digital signature – certifying authorities for signatures – legal status of e-commerce transactions

#### Module 4

Payment systems in e-commerce – cheque payment, credit card payments, e-cash payments. Complete system analysis and design case studies – a system for journal acquisition in libraries – walk through the entire life cycle

# DIGITAL IMAGE PROCESSING

## (BE/CS – 702)

### 1<sup>st</sup> Half

- **Introduction:** Image processing. Fundamental issues. What is the role of perception? Matlab orientation.
- **Basic image models and definitions:** pixels, sampling, quantization, resolution, representation as a matrix, operations, camera angles and perspective transformations
- **Image transformations:** Fourier transform and spectral analysis, separable transformations, principal component analysis, wavelets.
- **Image enhancement:** histograms, subtraction, averaging, spatial filtering and sharpening, lowpass and highpass filtering.
- **Image restoration:** brief overview and models

### **2<sup>nd</sup> Half**

- **Image compression:** fundamental principles, compression models, variable-length coding, predictive coding, JPEG and GIF standards.
- **Image segmentation:** line and edge detection, boundary detection, thresholding, region-oriented approaches.
- **Topological approaches:** representations of boundaries and regions, morphology.
- **Image recognition:** statistical classifiers, neural network approaches.

# ARTIFICIAL INTELLIGENCE & SOFT COMPUTING

Paper: BE/CS-703

## FIRST HALF

1. **Introduction:** What is AI? The foundations of AI. Importance of AI and related fields.
2. **Logic:** propositional and predicate logic, representation atoms, connectives, literals, CNF, DNF and casual form, interpretation and model, satisfiability, resolution principle and unification.
3. **Reasoning under Uncertainty:** basic probability notation, probabilistic reasoning, Bayesian networks, certainty factor methods, basics of fuzzy logic.
4. **Rules:** working memory, rule base, conflict set, conflict resolution strategies, backward and foreword chaining, meta rules.
5. **Structure Representation:** semantic networks, frames, conceptual dependency, scripts, inheritance, default values.

## SECOND HALF

1. **General issues in knowledge representation and interference:** logical agents, reasoning and resolution, adequacy, richness, granularity, ease of representation and use, modeling uncertainty, the fame problem, declarative and procedural representation.
2. **Problem solving by Searching:** State space repetition, heuristics, heuristic evolution function, and problem reduction. Searching for solutions. Informed and uninformed search strategies.
3. **Search Methods:** generate and test, hill climbing, means-ends analysis, depth-first, breath-first, best first, exploiting domain constraints, dependency-directed back tracking, minimax, alpha- beta pruning, iterative deepening.

### Relevant Books:

1. Artificial Intelligence by E Rich and K Knight, KcGraw-Hill.
2. Artificial Intelligence (3<sup>rd</sup> Ed) PH Winston, Addison-Wesley.
3. Introduction of Artificial Intelligence and expert systems by DW Patterson, PHI.
4. Artificial Intelligence a Modern Approach-Stuart Russell, Peter Norvig, PHI

# **DATA MINING**

BE/CS – 704

## **FIRST HALF**

### **1. Introduction:**

What is data mining, data mining functionalities, classification of data mining systems, major issues in data mining, Data warehouse, multidimensional data model, data warehouse architecture, implementation, data cube Technology.

### **2. Data Marts:**

Types of data marts, Loading a data mart, Metadata for a data mart, Data model for a data mart, Maintenance of a data mart, Nature of data in a data mart, software components for a data mart, Tables in a data mart, Other Aspects of data mart: External data, Reference data, Performance issues, Monitoring requirements for a data mart, Security in a data mart.

### **3. Online Analytical Processing:**

Introduction. OLTP and OLAP Systems. Data Modeling- star schema or Snow Flake Schema. OLAP Tools: Categories of OLAP Tools, Managed Query Environment (MQE), State of the market: Overview of the state of the international market, Cognos Power play, IBI Focus Fusion, Pilot Software, Arbor Essbase Web, Information Advantage Web OLAP, Micro strategy DSS Web, Brio Technology. OLAP Tools and the internet.

## **SECOND HALF**

### **4. Data Preprocessing**

Data cleaning, data integration and transformation, data reduction, Discrimination and concept hierarchy generation.

### **5. Data Mining:**

Introduction. From Data Warehousing to Data Mining, Steps of Data Mining, Data Mining Algorithms: Database Segmentation, Predictive Modeling, Link Analysis. Tools for Data Mining.

### **6. Developing Data Warehouse:**

Why and how to build a data warehouse, Data Warehouse Architectural Strategies and Organizational Issues. Design Considerations. Data Content. Metadata. Distribution of Data. Tools for Data Warehousing. Performance Considerations. Crucial Decisions in Designing a Data Warehouse. Various Technological considerations.

### **7. Case Study:**

Retail Sales, Inventory, CRM, Banks, & Education Procurement & Order Management.

## Books

### **Prescribed Text Book(S)**

1. Data Warehousing Fundamentals,  
By: Ponnaiah, Paulraj Wiley, 2001.
2. Data Warehousing: Concepts, Techniques, Products & Applications  
By: C S R Prabhu, PHI Pvt Ltd.
3. The Data Warehouse Toolkit  
By: Kimball R, Wiley, 2nd Ed., 2002.
4. Data Mining concepts and techniques,  
By: Jiawei Han, Micheline Kamber,  
Morgan Kaufmann Publishers.

### **Reference Books**

1. Data Warehousing in the Real World By: Anahory S, & Dennis M, Pearson Education, 1997
2. Database Management Systems, By: R Ramakrishnan & J Gehrke ,MGHISE, 3rd Ed., 2003.



# NETWORK SECURITY

Paper: BE/CS-705/1

## **FIRST HALF**

**Basic Cryptography:** - Classification of attacks, Evolution of Cipher Techniques, Symmetric and asymmetric key cryptography, Confusion and Diffusion.

**Conventional Cryptography:** - Substitution and Transposition ciphers. Cipher Implementation-P-Box, and Product Cipher, Fernald structure, Block Ciphers-DES, AES, Meet in the Middle Attack, Triple DES and IDEA, Classical Techniques, Modern Techniques, Algorithms, Confidentiality Using Conventional Encryption.

**Public-Key Encryption and Hash Functions:-** Public-Key Cryptography ,Deffie - Hellman Cryptosystem , Man in the Middle Attack ,Message Authentication and Hash functions; Hash and MAC Algorithms,SHA-1 Algorithm, RSA and the Knapsack algorithm.

**Authentication Protocols:-**Authentication techniques based on Shared Secret Key, Key Distribution Centre, Kerberos, Public Key Encryption and Public Key certificates.

**Digital Signatures:-**Secret Key Signatures. Public Key Signatures and DSS.

## **SECOND HALF**

**Network Security Practice:** Authentication applications, Kerberos, X.509 Directory Authentication Service, Electronic Mail Security; S/MIME,IP Security Architecture, Combining Security Associations, Key Management, Web Security; Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction(SET), System Security: Intruders, Viruses and Related Threats, Types of Viruses, Trusted Systems.

**E-mail and Internet Security:** PGP and PEM, Firewalls, Types of Firewalls, Firewall Configuration, Firewall Design Principles, Classical attacks on the Internet, IP Sec, IP Spoofing attacks.

### **Books:-**

1. A. Tanenbaum: Computer Networks, 3rd ed. Prentice Hall, 1996 (PHI 1997).
2. B. Schneider: Applied Cryptography, 2nd ed. Wiley, 1996.
3. C. Kaufman, R. Pearlman and M. Speciner: Network Security, Prentice Hall, 1995.
4. D. R. Stinson: Cryptography: Theory and Practice, CRC Press, 1995.
5. G. J. Simmons Ed.: Contemporary Cryptography, IEEE Press, 1991.
6. Behrouz A. Forouzan, Data Communication and Networking, TMH Press.
7. William Stallings, Cryptography and Network Security, LPE Press.

# **ADVANCED MICROPROCESSOR**

Paper: BE/CS-705/2

## **FIRST HALF**

### **1. 8086 Microprocessor**

1. Introduction
2. Features of 8086
3. 8086 Internal Architecture
  1. Bus Interface Unit
  2. Execution Unit
4. 8086 Addressing Modes
5. Instruction Sets of 8086
6. Assembly Language Fundamentals
  1. Introduction
  2. Programming Format for Executing Program on SDK86
  3. Writing Programs For Use With An Assembler
  4. Assembler Directives
7. Macro And Procedures

### **2. 8086 CPU Hardware Design**

1. 8086 Pin Configuration
2. Minimum Mode Configuration
3. Maximum Mode Configuration
4. System Bus Timing
5. Interrupt Structure Of 8086
6. Microprocessor Bus Types And Buffering Techniques

### **3. Memory And I/O Design**

1. Introduction
2. Memory
3. Types Of Main Memory
4. 8086 Memory Banks
5. Generating 8086 System Clock And RESET Signal
6. Address Decoding Techniques
7. PROM Decoders
8. PLA (Programmable Logic Array)
9. PAL (Programmable Logic Array)
10. Important Points To Be Considered For Interfacing SRAM & ROM

## **SECOND HALF**

### **1. 8051 Micro-Controller**

1. Introduction
2. 8051 Block Diagram
3. Addressing Modes
4. Instruction Set

5. 8051 Programming
  6. Memory & 8255 (PPI) Interfacing
2. **Advanced Microprocessor**
    1. Introduction
    2. Introduction To 80486 Microprocessor
      - i. Features Of 80486 Microprocessor
      - ii. Architecture Of 80486
      - iii. 80486 Memory System
    3. Introduction To Pentium Microprocessor
      - i. Super-scalar Architecture
      - ii. Special Pentium Register
      - iii. The Memory System
      - iv. Features
  3. **Embedded Control, I/o Processors And Co-processors**
    1. Single Chip Microprocessor or Micro-Controllers
    2. Microprocessor for Embedded Control
    3. I/O Processor
  4. **Co-Processor**

**Books Recommended: --**

1. 8086 Microprocessor & 8051 Micro-Controller  
By K.M. Bakwad & S. R. Patil Shree Publication
2. Advanced Microprocessors and Interfacing  
By Badri Ram TATA McGRAW HILL Publication

## E-COMMERCE & ERP

BE/CS-705/3

### FIRST HALF

1. **Electronic Commerce** : Overview, Definitions, Advantages & Disadvantages of E – Commerce, Threats of E – Commerce, Managerial Prospective, Rules & Regulations For Controlling E – Commerce, Cyber Laws.
2. **Technologies** : Relationship Between E – Commerce & Networking, Different Types of Networking For E – Commerce, Internet, Intranet & Extranet, EDI Systems  
**Wireless Application Protocol** : Definition, Hand Held Devices, Mobility & Commerce, Mobile Computing, Wireless Web, Web Security, Infrastructure Requirement For E – Commerce .

3. **Business Models of e – commerce** : Model Based On Transaction Type, Model Based On Transaction Party - B2B, B2C, C2B, C2C, E – Governance.
4. **Content Management** : Definition of content, Authoring Tools & Content Management, Content – partnership, repositories, convergence, providers, Web Traffic & Traffic Management ; Content Marketing.
5. **Call Center** : Definition, Need, Tasks Handled, Mode of Operation, Equipment , Strength & Weaknesses of Call Center, Customer Premises Equipment (CPE).

## SECOND HALF

7. **E – Payment Mechanism** : Payment through card system, E – Cheque, E – Cash, E – Payment Threats & Protections. **E– Marketing**
8. **Electronic Data Interchange (EDI)** : Meaning, Benefits, Concepts, Application, EDI Model, Protocols (UN EDI FACT Data Encryption (DES / RSA).
9. **Risk of E – Commerce** : Overview, Security for E – Commerce, Security Standards, Firewall, Cryptography, Key Management, Password Systems, Digital certificates, Digital signatures. 4

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**10 Enterprise Resource Planning (ERP)** : Features, capabilities and Overview of Commercial Software, re-engineering work processes for IT applications, Business Process Redesign, Knowledge engineering and data warehouse .

ERP-Present and Future: **Enterprise Application Integration (EAI), ERP and E-Commerce, ERP and Internet, Future Directions in ERP**

### Reference :

1. E-Commerce, M.M. Oka, EPH
2. Kalakotia, Winston : Frontiers of Electronic Commerce , Pearson Education.
3. Bhaskar Bharat : Electronic Commerce - Technologies & Applications. TMH
4. Loshin Pete, Murphy P.A. : Electronic Commerce , Jaico Publishing Housing.
5. Murthy : E – Commerce , Himalaya Publishing.
6. E – Commerce : Strategy Technologies & Applications, Tata McGraw Hill.
7. Global E-Commerce, J. Christopher & T.H.K. Clerk, University Press
8. Beginning E-Commerce, Reynolds, SPD
9. Krishnamurthy, E-Commerce Mgmt, Vikas

## INFORMATION THEORY AND CODING: (BE/CS-705/4)

**Information theory** - information and entropy - properties of entropy of a binary memoryless source - extension of a binary memoryless source - source coding theorem - Shannon fano coding - Huffman coding - Lempel ziv coding - discrete memoryless source - binary symmetric channel - mutual information - properties - channel capacity - channel coding theorem.

**Coding I-** linear block codes - generator matrices - parity check matrices - encoder - syndrome and error correction - minimum distance - error correction and error detection capabilities - cyclic codes - coding and decoding.

**Introduction to algebra** - groups - fields - binary field arithmetic - construction of Galois field - basic properties - computations - vector spaces - matrices - BCH codes - description - decoding - reed solomon codes.

**Coding II-** convolutional codes - encoder - generator matrix - transform domain representation - state diagram - distance properties - maximum likelihood decoding - viterbi decoding - sequential decoding - interleaved convolutional codes. Turbo coding. Trellis

## **SESSIONAL WORK**

### **Soft Computing (BE/CS - 706 )**

Sessional work based on theoretical subject CS-703

### **Image Processing(BE/CS - 707 )**

Sessional work based on theoretical subject Using Matlab 7.0

### **Web Technology –I (BE/CS - 708 )**

#### **Pre-Project & Seminar (BE/CS=709)**

Each candidate or a group will assign a problem in “Computer Science and Engineering ” on which the candidate(s) will carry out detail review/ study and/or analysis. They will submit a detail report and present his/ her/ their work in an open defend at the end of the Semester

#### **Viva Voce –I (BE/CS=710)**

#### **PROFESSIONAL SKILL DEVELOPMENT- I (BE/GP-2)**

- ❖ Filling up of Curricula Vitae.
- ❖ Response to a Job advertisement.
- ❖ Joining Report in a Profession.
- ❖ Report writing on issues related to your profession such as – Improvement of work culture, Improvement of Relationship with your Collogues, submission of a sum-up of annual Report, Maintaining of Environment Friendly atmosphere in the office, Basic amenities requirement to run a good Organization / Office.
- ❖ Basic requirements of Management / Managerial Jobs.
- ❖ Notice Inviting Tenders, Issuance of Supply Orders, Memo, Complaint Letter, Invitation, Notifications etc.
- ❖ Oral Communicative Skill Practice.
- ❖ Mock Interview

## **EIGHTH SEMESTER**

Sl. No.	Name of Subjects	Code No	Periods/ Week			Full Marks	Credits
			L	T	P/S		
<b>Theory</b>							
01.	Mobile Computing	BE/CS - 801	3	1	0	100	3
02.	Distributed System	BE/CS - 802	4	0	0	100	4
03.	Neural Network & Fuzzy Logic	BE/EC - 802	3	1	0	100	3
04.	Open Elective-II	BE/CS-803	3	1	0	100	3
05.	Industrial Management	BE/ME – 811	4	0	0	100	4
<b>Practical / Sessional</b>							
06.	Web Technology Lab –II	BE/CS – 806	0	0	3	100	2
07.	Advance Java Programming lab	BE/CS --807	0	0	3	100	2
08.	Case studies on Software design	BE/CS --808	0	0	3	100	2
09.	Project & Thesis	BE/CS – 809	0	0	5	100	3
10.	Viva voce-II	BE/CS – 810	0	0	0	50	1
11.	Professional Skill Development-II	BE/GP-3	0	0	2	50	1
<b>Total</b>			36			1000	28

**Open Electives:**      **i) Parallel Processing**  
                                 **ii )Web Design & Multimedia**

# **MOBILE COMPUTING**

Paper: BE/CS-801

## FIRST HALF

Introduction to Wireless Communication: Definition, Different kinds of mobility, Characteristics of communicating devices, Fundamentals of Cellular Systems and its Characteristics, Network model-Layers and protocols-wired/wireless environments, Wireless transmission: Signals, Antennas, Multiplexing: SDM,FDM,TDM,CDM,

## SECOND HALF

Spread Spectrum: GSM,CDMA, Higher layer protocols- TCP/IP in wired/wireless environments, Mobile IP, Lower layer protocols- MAC and related. IEEE 802.11 series, 802.16, Mobile Adhoc Network concepts and routing protocols, Wireless application protocol, Bluetooth.

### Reference Book:

1. Wireless Communications and Networking, William Stallings, PHI
2. Mobile Communication, Jochen Schiller, LPE
3. Wireless Communication, Rappaport
4. Data Communication and Networks Forouzan,Mcgrawhill.

# **DISTRIBUTED SYSTEMS**

**(Paper:BE/CS-802)**

## FIRST HALF

1. **Characterization of distributed systems:** Introduction, examples of distributed systems, resource sharing and the web.
2. **Design goals:** Architectural model, fundamental model.
3. **Interprocess communication:** External data representation and Marshalling, client-server communication, group communication.
4. **Remote Procedure Call**
5. **Distributed operating system:** the operating system layer, protection processes and threads, communication and invocation, operating system architecture.
6. **Distributed file systems:** File service architecture, case studies: Sun network file systems and Andrew file system.

## SECOND HALF

**7. Name Services:** Name services and the Domain Name System,Directory and Discovery Services.

**8. Transactions and concurrency control:** Flat and Nested transactions,Locks,Optimistic concurrency control, timestamp ordering.

**9. Distributed Transaction:** Flat and Nested distributed Transaction, Atomic commit protocols, Concurrency control in distributed transactions, Distributed Deadlocks, Transaction recovery.

**10. Replication:** System model and group communication, Fault-tolerant services, highly available services, transactions with replicated data.

**11. Distributed Shared memory:** Design and Implementation Issues, Sequential consistency and Ivy, Release consistency and Munin, Other consistency models.

#### References:

1. Distributed Systems: Concepts & Design by George Coulouris, Addison Wesley Pvt. Ltd.
2. Distributed Systems by Tanenbaum, Prentice Hall of India.
3. Distributed Operating Systems by Pradeep K. Sinha, Prentice Hall of India.
4. Distributed Systems & Networks by William Buchanan, TataMcGrawHill.

## NEURAL NETWORK & FUZZY LOGIC

Paper: BE/EC - 802

### FIRST HALF

**FUZZY LOGIC:-** Conventional & Fuzzy sets, fuzzy relations, fuzzy operations, realization of fuzzy systems using fuzzy relation, application of fuzzy logic in vision, pattern recognition, robotics & linguistics. **Neuron Computing:-** Models of neuron computing:- perception training, back propagation learning, Hopfield nets, adaptive resonance theory I & II, self-organizing feature map, ADALINE. Applications in pattern classification & Image understanding.

### SECOND HALF

**Genetic algorithms:-** The basic operators, schema theorem, convergence analysis, stochastic models, Applications in search & optimization. **Learning with GA & NN:-** Composite use of fuzzy logic neural network & genetic algorithms. Chaos theory, Fusion of neuron, Fuzzy, GA & chaos theory & applications.

#### BOOKS RECOMMENDED:-

1. Neuro Fuzzy & soft computing. Jung, Sun, Mizutani. Pierson publication..
2. Neuro Fuzzy System:- Lee & Lin. CRC Publication.



# **INDUSTRIAL MANAGEMENT**

## **(BE/ME – 811 )**

### **FIRST HALF**

#### **Introduction to Management Science**

Principles & functions of management — Contributions of F.W. Taylor, Henry Fayol, Max Weber and Elton Mayo & Roethlisburger in development of the theories of management science.

#### **Organisational Behaviour**

Objectives — Brief introduction to: Motivation & Morale – Perception – Leadership & Leadership Styles – Communication – Team Building – Work Culture.

#### **Human Resources Management**

Scope & Functions – Human Resources Planning – Selection & Recruitment – Training & Development – Performance Appraisal – Industrial Safety.

#### **Production Management**

Production Planning: Routing – Loading – Scheduling — Production Control: Expediting – Dispatching — Materials Handling — Work Study — Productivity — Quality Management: Tools & Techniques – Quality Management System.

### **SECOND HALF**

#### **Materials Management**

Objectives & functions: Purchase function – Stores function — Inventory Management: ABC, VED analyses.

#### **Financial Management**

Financial Ratios — Elements of Costing — Auditing

#### **Marketing & Sales Management**

Objectives & Functions — Marketing of products & Services — Advertising & Sales Promotion — Consumer Behaviour

#### **Quantitative techniques**

Linear programming (graphical method only) — Network Analysis: PERT – CPM

#### **REFERENCE BOOKS**

Essentials of Management / Kontz / McGraw-Hill of India

Organization & Behaviour / M. Banerjee / Allied Publishers

Human Behaviour at Work: Organizational Behaviour / Keith Davis & Newstrom / McGraw-Hill of India

Human Resources Management / Mirza Saiyatin / Tata McGraw-Hill

Production Management & Control / Nikhil Bharat / U.N. Dhar & Co.

Production Management / Keith Lockyer / ELBS

Marketing Management / Philip Kotler / Prentice Hall of India

# **Parallel Processing**

**Paper : BE/CS-805/1**

## **FIRST HALF**

### **Theory of Parallelism:**

Parallel computer models -the state of computing, Multiprocessors and Multicomputers and Multivectors and SIMD computers, PRAM and VLSI models, Architectural development tracks. Program and network properties Conditions of parallelism, Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures. Principles of scalable performance -performance matrices and measures, parallel processing applications, speedup performance laws, scalability analysis and approaches.

### **Hardware Technologies**

Processor and memory hierarchy advanced processor technology, superscalar and vector processors, memory hierarchy technology, virtual memory technology, bus cache and shared memory -backplane bus systems, cache memory organizations, shared memory organisations, sequential and weak consistency models.

### **Pipelined Computer System**

Principles of pipelining. Performance and cost. Instruction & Arithmetic Pipelining. Data dependencies. Internal forwarding. Multithreading. Reservation tables & pipeline scheduling.

## **SECOND HALF**

### **Data Flow Computers**

Multivector and SIMD computers, Scalable, Multithreaded and data flow architectures. Data Flow Computer Architecture. Static & dynamic data flow. Control flow vs data flow. Data flow language. Advantages and Problems. VLSI computing structure.

### **Software & Parallel Programming**

Parallel models, Languages and compilers, Parallel program development and environments.

### ***Books Recommended:***

1. Kai Hwang, "Advanced Computer Architecture", McGraw Hill International, 1993.
2. Computer Architecture and Parallel Processing, K. Hwang and F.A Briggs. McGrawHill
3. Introduction to Parallel Computing, second edition by Grama, Gupta, Karypis & Kumar.
4. William Stallings, "Computer Organization and Architecture", Macmillan Publishing Company, 1990.
5. M.J. Quinn, "Designing Efficient Algorithms for Parallel Computers", McGraw Hill International, 1994.
6. M. Sasikumar, et.al., "Introduction to Parallel Processing", PHI, New Delhi, 2000
7. V. Rajaraman, C. Siva Ram Murthy, "Parallel Computers Architecture and Programming", PHI, New Delhi.

8. Highly Parallel Computing Georges S. Almasi, Addison Wesley Pvt Ltd
9. Parallel Processing ,D.Crookes,P.J.Sweeney, Addison Wesley Pvt Ltd

## **ADVANCED MOBILE COMMUNICATION (BE/CS-805/4)**

### **INTRODUCTION**

Introduction to Wireless Mobile communication

Location dependent services

Mobile and Wireless devices

History of wireless communication

A simple reference model

### **WIRELESS TRANSMISSION**

- Frequencies for for Radio Transmission
- Regulations act
- Modulation used
- Direct Sequence Spread Spectrum
- Frequency Hopping spread spectrum

### **CELLULAR SYSTEMS**

Cellular networks

Frequency reuse

GSM and its services

GSM Architecture

Protocol Architecture of GSM

### **MOBILE TRACKING**

Location updates and paging

Handover

Security

Authentication/Encryption

## NEW DATA SERVICES

GPRS

DECT

UMTS and IMT-2000

## WIRELESS LAN

Overview

Advantages/Disadvantages

IEEE802.11

Protocol/Architecture

Roaming

## MOBILE NETWORK LAYER

Mobile IP: Goals

Entities and terminology in MIP

IP Packet delivery

Agent advertisement and discovery

Registration

Tunneling: Encapsulation

Reverse Tunneling

Routing

References:

- 1) Mobile Cellular Telecommunications; 2nd ed.; William, C Y Lee McGraw Hill
- 2) Wireless and Digital Communications; Dr. Kamilo Feher (PHI)
- 3) T.S. Rappaport, "Wireless Communication, principles & practice", PHI, 2001

# SESSIONAL

## WEB TECHNOLOGY LAB –II (BE/CS – 806)

### **MODULE 1 A. HTML BASICS**

To create an HTML document with the main structure elements (HTML, HEAD, BODY), save it and display it on a browser.

To create an HTML document and add the following: (a) Comments, (b) Headings (H1 to H6), (c) Paragraph, (d) Visual line break.

### **B. FONTS ,COLOUR ,LISTS & TABLES**

To create an HTML document and add the following: (a) Fonts, (b) Colours, (c) Lists, (d) Signature Text blocks.

To create in an HTML document a Table and mention the following: (a) Table variables, (b) Table element, (c) CAPTION element, (d) Table ROW element, (e) Table Data element, (f) Table Heading element.

### **C. HYPER LINKS ,FRAMES & IMAGES**

To create a web page using HTML and clarify the following: (a) how to create HYPERLINK, (b) how to create FRAMES, (c) how to Insert an IMAGE.

### **MODEUL-2 HTML / APPLET**

1. Creating simple HTML file, place it in web server and access it from client Browser.
2. Creating a HTML form incorporating GUI components (Command button, text box, radio button, check box, combo box etc).
3. Creating a simple applet and embedding it in HTML file.
4. Writing applet to in corporate GUI components (Command button, text box, radio button, check box, combo box etc).
5. Writing applet to incorporate events.

### **MODULE –3 ACTIVE SERVER PAGES**

1. Introduction to Active Server Pages.
2. Elements of ASP (Scripts, Objects, Components).
3. Making your first Active Server Page.
4. WORKING WITH ASP: Using HTTP — Writing simple ASP files — Controlling Execution of server side scripts — Problems on HTML forms to get user information and retrieving HTML form contents — Working with query string.
5. ASP SESSION: Introduction to session — Familiarity and working with session objects (simple problems) — Using session events — Familiarity and working with cookies.
6. ASP APPLICATION: Introduction to ASP Application features of ASP Application — Creating a Simple ASP Application, Setting the properties of ASP Application — Using Application objects and Application events.
7. ASP COMPONENTS: Using Components in ASP ( Simple problems) — Creating Components with page scope, session scope, Application scope — Working with browser capability component, file assess components , counter components etc.(Simple problems)

8. DATABASE MANAGEMENT THROUGH ASP: Brief overview of ActiveX Data Objects — Using ADO to access a database from ASP (Simple Problem) — Opening, closing database connection — Executing SQL statements.

Reference Books :

HTML: The Complete Reference / Thomas A. Powell / Tata Mc-Graw Hill Pub. Co. Ltd.

HTML and XML an Introduction / Prentice Hall of India Pvt. Ltd.

Internet: An Introduction / Tata Mc-Graw Hill Pub. Co. Ltd\_\_\_\_\_

## **A D V A N C E D   J A V A   P R O G R A M M I N G   L A B (B E / C S – 8 0 7)**

J A V A

### **Module 1    J A V A   P R O G R A M M I N G   F U N D A M E N T A L S**

To write a Java application program which clarify the following points:

- (i) How to compile and run,
- (ii) How to set path and classpath,
- (iii) Single and Multi-line comments, and,
- (iv) Command line arguments.

### **Module 2    D A T A   T Y P E S ,   V A R I A B L E S   O P E R A T O R S   &   A R R A Y S**

To write a Java program which defines and initialized different data types: byte, short, int, long, float & double and clarify the following points: (a) dynamic initialization, (b) type conversion and casting.

Problems related to Character and Boolean data type.

Problems related to one and two dimensional array.

Problems related to Arithmetic, bit wise and relational operators.

### **Module 3    C O N T R O L   S T A T E M E N T S   &   L O O P I N G   S T R U C T U R E**

Problems related to: IF-ELSE, IF-ELSE-IF, SWITCH statements.

Problems related to the following looping statements — WHILE, DO-WHILE & FOR.

Problems related to nested looping and jump statements (BREAK, CONTINUE & RETURN)

### **Module 4    C L A S S E S , O B J E C T S   &   M E T H O D S**

To write a Java program to clarify the following points: (a) how to declare a class, (b) how to create an object, (c) how methods are defining in a class, (d) access variables and methods.

To construct a Java program which defines: (a) how arguments values are passed to a method, (b) use of new operator, constructor and finalize ) method, (c) passing objects to a method, (d) declaration of static keyword.

To practice problems related to: (a) Method overloading, (b) Multiple constructor, (c) Calling constructor from a constructor.

### **Module 5    E X C E P T I O N   H A N D L I N G**

To write a Java program which is constructed using TRY, CATCH and FINALLY blocks

### **Module 6    I N H E R I T A N C E   &   E X T E N D I N G   C L A S S E S ( I N T E R F A C E )**

6.1 To write Java programs which clarify the following: (a) super class, (b) sub-class / derive class, (c) understanding abstract and final class, (d) polymorphism.

6.2 To practice problems related to: (a) Multiple Inheritance, (b) Interface, (c) Extending Interfaces.

**Module 7    THREAD & MULTI-THREAD**

**Module 8**    To practice problems related to main thread, sub-threads and thread priorities.

**Module 9    JAVA NETWORKING**

8.1 To write a Java program which displays the: (a) IP address of a corresponding host name, (b) Different parts of an URL (e.g. Protocol, Port no, hostname, Filename).

8.2 To practice problems related to Socket programming (minimum two problems).

**Module 10   DATA BASE CONNECTIVITY : JDBC**

9.1 To practice problems related to data base connection using JDBC: ODBC bridging driver.

9.2 To write a Java program which connects to the data base (Access / Oracle) and displays the output.

**REFERENCE BOOKS**

1. JAVA 2: The Complete Reference / Herbert Schildt / Tata Mc-Graw Hill Pub. Co. Ltd.
2. Head First Java / K. Sierra & B. Bates , O'Reilly
3. Internet and Java Programming / R. Krishnamoorthy & S. Prabhu / New Age International (p) Ltd.
4. Beginning Java 2 / Ivor Horton / Wrox Press Ltd (SPD)
5. Beginning Java Networking / C. Darby, J. Griffin and others / Wrox Press Ltd. (SPD)
6. Teach yourself Web Technologies Part – I / Ivan Bayross / BPB Publications

**CASE STUDIES ON SOFTWARE DESIGN (BE/CS –808)**

Case study on atleast 10 (ten) project

**PROJECT AND THESIS (BE/CS-809)**

Each candidate or a group assigned problem (Preliminaries of Project & Thesis) in “Computer Science and Engineering” in 7<sup>th</sup> Semester on which the candidate(s) will carry out detail review/ study and /or analysis. They will submit a detail Project report and present his/ her/ their work in an open defend at the end of the Semester.

**GRAND VIVA (BE/CS-810)**

Viva Voce test will be based on theoretical and practical knowledge of students in their branch of Engineering.

**PROFESSIONAL SKILL DEVELOPMENT- II (BE/GP-3)**

- ❖ Group Discussion
- ❖ SEMINERS (Power Point Presentation)
- ❖ Extempore Speech Practice
- ❖ Details of Future Profession of the Student Concerned – to be prepared / presented in the practice shop.
- ❖ General aptitude Test.



## **Mathematical Logic and Functional Programming**

**BE/CS - 803**

• Evolution of logic programming • Propositional Logic Syntax, Semantics, Logical Consequences  
• First Order Predicate Logic Syntax, Semantics, Logical Consequences, Clausal Form, Resolution  
• Herbrand's Theorem Skolemization, Semantic Tree, H-Universe, H-Theorem, Implementation of H-Theorem. • Concepts of Logic Programming With Prolog • Functional Programming Concepts • Functional Programming Techniques Functions, recursion, macros, user defined control constructs, higher order constructs, types, data abstraction, polymorphism, semantics, implementation issues • Introduction to functional programming languages Concepts of lambda calculus • Functional programming With Haskell/ML//Gofor/Scheme

### **Books & References :**

1. D. A. Watt. Programming Languages and Paradigms, Prentice Hall 1990
2. J. Lloyd. Foundations of Logic Programming, Springer Verlag, 1984
3. M. Hennessey. The semantics of Programming Languages, John Willey, 1990
4. Luca Cardelli and P. Wegner On Understanding Types, Data Abstraction and Polymorphism, Computing Surveys, 17(4), pp 471, 1985 C. Reade. Elements of Functional Programming, Addison Wesley, 1989