Semester III **B.Tech.(Computer Science & Engineering)**

MAT 105 : ADVANCE ENGINEERING MATHEMATICS

3L+1T+0P+3.5C **MM:100**

Module 1: LAPLACE TRANSFORM - Laplace transform with its simple properties, applications to the solution of ordinary and partial differential equations having constant co-efficients with special reference to the wave and diffusion equations.

Module 2: FOURIER SERIES & Z TRANSFORM – Expansion of simple functions in Fourier series. Half range series, Change of intervals, Harmonic analysis. Z -TRANSFORM - Introduction, Properties, Inverse Z Transform.

Module 3: FOURIER TRANSFORM - Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier Transform to solution of partial differential equations having constant co-efficient with special reference to heat equation and wave equation.

Module 4: COMPLEX VARIABLES I - Analytic functions, Cauchy-Riemann equations, Elementary conformal mapping with simple applications, Line integral in complex domain, Cauchy;s theorem. Cauchy's integral formula.

Module 5: COMPLEX VARIABLES II -Taylor's series Laurent's series poles, Residues, Evaluation of simple definite real integrals using the theorem of residues. Simple contour integration.

Text/Reference Books:

1. Engineering Mathematics, T Veerarajan, TMH
2. Mathematical Techniques, Jordan, Oxford
3. Advance Engineering Mathematics, Potter, Oxford
4. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley
5. Mathematical Methods, Dutta, D., New Age
6. Text BOOK Of Engineering Mathematics, Dutta, New Age

Semester III **B.Tech (Computer Science & Engineering)**

BEC 301 : ELECTRONICS DEVICES AND CIRCUITS

3L+0T+0P+3C **MM 100**

MODULE1: SEMICONDUCTOR PHYSICS - Mobility and conductivity, Charge densities in a semiconductor, Fermi Dirac distribution, Fermi-Dirac statistics and Boltzmann approximation to the Fermi-Dirac statistics, Carrier concentrations and Fermi levels in semiconductor, Generation and recombination of charges, Diffusion and continuity equation, Transport equations, Mass action Law, Hall effect.

MODULE 2: JUNCTION DIODES - Formation of homogenous and hetro-juntion diodes and their energy band diagrams, Calculation of contact potential and depletion width, V-I characteristics, Small signal models of diode, Diode as a circuit element, Diode parameters and load line concept, C-V characteristics and dopant profile. Applications of diodes in rectifier, Clipping, Clamping circuits and voltage multipliers, Breakdown diodes, Schottky diodes, and Zener diode as voltage regulator, Construction, Characteristics and operating principle of UJT.

MODULE 3: TRANSISTORS- Characteristics, Current components, Current gains: alpha and beta. Variation of transistor parameter with temperature and current level, Operating point, Hybrid model, DC model of transistor, h-parameter equivalent circuits.CE, CB and CC configuration.DC and AC analysis of single stage CE, CC (Emitter follower) and CB amplifiers AC & DC load line, Ebers-Moll model.Biasing & stabilization techniques.Thermal runaway, Thermal stability.

MODULE 4: JFET & MOSFET - Construction and operation, Noise performances of FET, Parasitic of MOSFET, Small signal models of JFET & MOSFET, Biasing of JFET's & MOSFET's, Low frequency single stage CS and CD (source follower) JFET amplifiers, FET as voltage variable resistor and FET as active load.

MODULE 5: SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCY - Analysis of BJT and FET multistage amplifier, DC and RC coupled amplifiers. Frequency response of single and multistage amplifier, mid-band gain, gains at low and high frequency. Analysis of DC and differential amplifiers, Miller's Theorem, use of Miller and bootstrap configuration, Darlington Emitter pair.

Text/Reference Books:

1."Integrated Electronics Analog and Digital Circuits & Systems" Millman J. &Halkias C.C., McGraw Hill.
2."Electronic Devices and Integrated Circuits" B. P. Singh and Rekha Singh, , Pearson Education
3."Application of Analog Integrated Circuits" Soclof, SPrentice Hall of India.
4. Electronics Devices & Circuit Theory" Boylestad&Nashelskey, Prentice Hall of India.
5. "Electronics Principles" Albert Malvino, McGraw Hill Education.

Semester III **B.Tech (Computer Science & Engineering)**

BEC 303: DIGITAL ELECTRONICS

3L+0T+0P+3C **MM 100**

MODULE 1: NUMBER SYSTEMS AND CODES: Introduction to number systems, weighted and non-weighted codes, 1's complement, 2's complement, complement arithmetic Introduction to Boolean algebra: Postulates and theorems of Boolean algebra, Boolean functions, canonical and standard form, simplification of Boolean function using Boolean laws and theorems

MODULE 2:LOGIC GATES: Diode and transistor as a switch, basic logic gates, derived logic gates, block diagrams and truth tables, logic diagrams from Boolean expression and vice versa, converting logic diagram to universal logic, positive logic, negative logic and mixed logic

MODULE 3: SIMPLIFICATION OF BOOLEAN FUNCTIONS: K-map representation, incompletely specified functions, simplification realization with gates, Quine-McCluskey method
Combinational Logic: Analysis and design of combinational circuits, half adder and full adder, half subtractor and full subtractor, binary serial and parallel adder, BCD adder, binary multipliers, magnitude comparator, decoders, encoders, multiplexers, de-multiplexers

MODULE4:SEQUENTIAL CIRCUITS: Latches, flip-flops, triggering of the flip-flops, master-slave flip-flop, excitation tables, conversion of the flip-flops, analysis and design of clocked sequential circuits, shift registers, counters

MODULE5: LOGIC FAMILIES: Logic gate characteristics (propagation delay, speed, noise margin, fan-in, fan-out, power dissipation), standard logic families (RTL, DCTL, DTL, TTL, ECL, MOS), tri-state devices
Programmable Logic: Introduction to programmable logic array (PLA) & programmable array logic (PAL

Text/Reference Books:

1. Digital Design, Moris Mano, Pearson Education
2. Digital Fundamental, Floyd and Jain, Pearson Education
3. Digital System: Principles and Applications, Tocci, Pearson Education
4. Digital Electronics, B. P. Singh, DhanpatRai& Sons
5. Modern Digital Electronics, R. P. Jain, Tata McGraw-Hill

Semester III **B.Tech.(Computer Science & Engineering)**

BCS 301 : DATA STRUCTURE AND ALGORITHMS

3L+0T+0P+3C **MM: 100**

Module 1: INTRODUCTION TO DATA STRUCTURES - Definition of data structures and abstract data types. Static and Dynamic implementations. Examples and real life applications, Data Structures: Arrays, Address calculation in a single and multi dimensional array. Sparse matrices

Module 2: STACKS, QUEUES AND LISTS - Definition, Array based implementation of stacks, Linked List based implementation of stacks, Examples: Infix, postfix, prefix representation, Applications: Mathematical expression Evaluation Definition: Queues & Lists: Array based implementation of Queues / Lists, Linked List implementation of Queues / Lists, Circular implementation of Queues and singly linked Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority queues, Applications

Module 3: TREES & GRAPHS - Definition of trees and Binary trees, Properties of Binary trees and Implementation, Binary Traversal - preorder, post order, in order traversal, Binary Search Trees, Implementations, Threaded trees, Balanced multi way search trees, AVL Trees, Implementations, Applications Definition of Undirected and Directed Graphs and Networks, The Array based implementation of graphs, Adjacency matrix, path matrix implementation, The Linked List representation of graphs, Shortest path Algorithm, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Connected components of graphs, Weighted Graphs, Applications.

Module 4: SORTING SEARCHING ALGORITHMS - Introduction, Sorting by exchange, selection, insertions, Bubble sort, Selection sort, Insertion sort, Pseudo code algorithm and their C++ implementation, Efficiency of above algorithms, Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays, The merge sort Algorithms, Quick sort Algorithm.

Module 5: ANALYSIS OF QUICK SORT, PICKING A PIVOT - A partitioning strategy, Heap sort, Heap Construction, Heap sort, bottom – up, Top – down Heap sort approach, Radix sort, Straight Sequential Search, Array implementations, Linked List representations, Binary Search, non – recursive Algorithms, recursive Algorithms, Indexed Sequential Search

Text/Reference Books:

1. Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by TMH
2. Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub.
3. Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman, Original edition, Addison-Wesley, 1999, Low Priced Edition.
4. Fundamentals of Data structures by Ellis Horowitz &SartajSahni, Pub, 1983,AW

Semester III **B.Tech.(Computer Science & Engineering)**

BCS 302 : OBJECT ORIENTED PROGRAMMING WITH C++

3L+1T+0P+3.5C **MM:100**

Objective: To understand the fundamentals of Object Oriented programming concept using C++. It includes defining the classes, invoking methods using class libraries.

Module 1: Different paradigms for problem solving, need for OOP, differences between OOP and Procedure oriented programming, Abstraction, Overview of OOP principles, Encapsulation, Inheritance and Polymorphism.

Module 2: **C++ BASICS**: Structure of a C++ program, Data types, Declaration of variables, Expressions, Operators, Operator Precedence, Evaluation of expressions, Type conversions, Pointers, Arrays, Pointers and Arrays, Strings, Structures, References. Flow control statement- if, switch, while, for, do, break, continue, goto statements. Functions-Scope of variables, Parameter passing, Default arguments, inline functions, Recursive functions, Pointers to functions.

Module 3: Dynamic memory allocation and de-allocation operators-new and delete, Preprocessor directives. C++ Classes And Data Abstraction: Class definition, Class structure, Class objects, Class scope, this pointer, Friends to a class, Static class members, Constant member functions, Constructors and Destructors, Dynamic creation and destruction of objects, Data abstraction, ADT and information hiding.

Module 4: **POLYMORPHISM** - Function overloading, Operator overloading, Generic programming necessity of templates, Function templates and class templates.Inheritance: Defining a class hierarchy, Different forms of inheritance, Defining the Base and Derived classes, Access to the base class members, Base and Derived class construction, Destructors, Virtual base class.

Module 5: **VIRTUAL FUNCTIONS AND POLYMORPHISM** - Static and Dynamic bindings, Base and Derived class virtual functions, Dynamic binding through virtual functions, Virtual function call mechanism, Pure virtual functions, Abstract classes, Implications of polymorphic use of classes, Virtual destructors.

Text/Reference Books:

1. Problem solving with C++, The OOP, 4th Edition, Walter Savitch, Pearson Education.
2. C++, The Complete Reference, 4th Edition, Herbert Schildt, TMH.
3. C++ Primer, 3rd Edition, S.B.Lippman and J.Lajoie, Pearson Education.
4. The C++ Programming Language, 3rd Edition, B.Stroutstrup, Pearson Education.
5. Object Oriented Programming in C++, 3rd Edition, R.Lafore, Galigotia Publications pvt ltd.

Semester III **B.Tech.(Computer Science & Engineering)**

BCS 304 : DATA STRUCTURE LAB

0L+0T+2P+1C **MM:100**

1. Program on array searching, sorting (Bubble sort, Quick sort, Marge sort etc.)
2. Program to insert element at desire position, replacing element, deletion in array.
3. Various matrices operations.
4. Various strings programs.
5. Implementation of stack and queue using array
6. Implementation of stack and queue using link lists
7. Implementation of circular queue using link lists.
8. Polynomial addition, multiplication.
9. Two-way link lists programs.
10. Infix to postfix/prefix conversion.
11. BST implementation (addition, deletion, searching).
12. Stack ADT (array implementation) Implementing basic operation of stack (push, pop) using array implementation

Semester –III **B.Tech (Computer Science & Engineering)**

BEC 306 : ELECTRONICS DEVICES & CIRCUITS LAB

0L+0T+2P+ 1C **MM 100**

1. Study the following devices: (a) Analog& digital multimeters (b) Function/ Signal generators (c) Regulated d. c. power supplies (constant voltage and constant current operations) (d) Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.

2. Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.

3. Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.

4. Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.

5. Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of Idss&Vp.

6. Application of Diode as clipper & clamper.

7. Plot gain- frequency characteristic of two stages RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.

8. Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.

9. Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.

10. Study half wave rectifier and effect of filters on wave. Also calculate theoretical & practical ripple factor.

11. Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple factor.

Semester III **B.Tech.(Computer Science & Engineering)**

BEC 307 : DIGITAL ELECTRONICS LAB

0L+0T+2P+1C **MM:100**

1. To study and perform the following experiments:

(a) Operation of digital multiplexer and demultiplexer.

(b) Binary to decimal encoder.

(c) Characteristics of CMOS integrated circuits.

2. To study and perform experiment - Compound logic functions and various combinational circuits based on AND/NAND and OR/NOR Logic blocks.

3. To study and perform experiment - Digital to analog and analog to digital converters.

4. To study and perform experiment - Various types of counters and shift registers.

5. To study and perform experiment - Interfacing of CMOS to TTL and TTL to CMOS ICs.

6. To study and perform experiment- BCD to binary conversion on digital IC trainer.

7. To study and perform experiment -

(a) Astable (b) Monostable (c) Bistable Multivibrators and the frequency variation with different parameters, observe voltage waveforms at different points of transistor.

8. To study and perform experiment -Voltage comparator circuit using IC-710.

9. To study and perform experiment- Schmitt transistor binary circuit.

10. Design 2 bit binary up/down binary counter on bread board.

Semester III **B.Tech.(Computer Science & Engineering)**

BCS 305: OBJECT ORIENTED PROGRAMMING LAB WITH C++

0L+0T+2P+1C **MM:100**

1. Create a user defined function (any) and use it inside the program.
2. Implement “call by value” & “call by reference “ function call techniques by using any user defined functions.
3. Implement the working of classes and objects by using any real world object.
4. Create a Stack object model in C++ & also make use of default and parameterized constructor to make the class more flexible in use.
5. Make all the member functions, including constructors, non-inline in the above class.
6. Create any user defined class using the concept of static data and member functions.
7. Create a Class or program implementing the concept of passing and returning object to/from member functions.
8. WAP to implement polymorphism through function overloading (Area of different shapes).
9. Create a user defined type Complex and do all the Complex number arithmetic. And also make use of operator overloading.
10. Implement single level inheritance by using Student and Marks class.
11. Implement multilevel inheritance by using the Stack class.
12. Demonstrate the calling mechanism of constructors and destructors in Multilevel Inheritance.
13. Create generic Stack model for storing different types of data.
14. Create a user defined type Matrix and perform all matrix operations. Also make use of operator overloading.
15. Implement the concept of Abstract classes and virtual functions by using Shape, Rectangle and Triangle class.

Semester III **B.Tech.(Computer Science & Engineering)**

ENG 115: SOFT SKILL & PROFESSIONAL APTITUDE

0L+0T+2P+1C **MM:100**

MODULE: 1- INTERPERSONAL RELATIONSHIP MANAGEMENT- Importance & Benefits of IPR, Developing Interpersonal Abilities, Team Building- Definition and Types, Team work skills, Qualities of a Team Player, Leadership- Understanding the qualities of a Good Leader, 4 Factors of Leadership, Bring out the Leader in You

MODULE: 2- RESUME WRITING- Concepts of Resume, Curriculum Vitae and Bio-data, Resume – Information and Details, Sample Resume and Template, Cover Letter- Cover letter Writing, Sample Cover letter and Template

MODULE: 3 -PERSONAL GROOMING AND INTERVIEW ETIQUETTE- Basic Personal Hygiene, Professional Attire – Men& Women, Interview Etiquette Guide, Telephonic Interview- Importance and Preparation, Advantages and Disadvantages, Things to Remember, Video Interview- Preparation and Practice, Guide to a Successful Video Interview, Importance and Types of Personal Interviews, FAQs with Answers

MODULE: 4 - GROUP DISCUSSION- Group Discussion Guide, Topics for Group Discussion, Mock GD

MODULE: 5 –EXTEMPORE- Guide to Successful Extempore, Extempore Topics, Practice Session

Text/Reference Books:

1. Business communication Design, Angell, Pamela, Mcgraw-Hill, New York.
2. Grammar Finder, Eastwood, John, Oxford university press.
3. Effective technical communication, Mitra, K. Barun, Oxford university press.

Communicate to conquer: A handbook of group discussion and interviews, PHI learning, New Delhi.

Semester III **B.Tech.(Computer Science & Engineering)**

MGT 201: ORIENTATION PROGRAM IN ENTREPRENEURSHIP

0L+0T+2P+1C **MM:100**

OBJECTIVE: The goal of this programme is to inspire students and help them imbibe an entrepreneurial mindset. Student will learn what entrepreneurship is and how it has impacted the world and their country. They will introduce to the key traits and the DNA of an entrepreneur. This certificate program focuses on a specific Entrepreneurial knowledge or skill requirement such as creative thinking, communication, risk taking and resilience.

Module 1:
Entrepreneurship; Concept, functions, Need, Characteristics and competency. How has entrepreneurship change the world? Process of Entrepreneurship development , Idea Generation exercises.

Module 2:
Entrepreneurial DNA, Traits Gaps and Gap Analysis. Relevance of Entrepreneurship in Socio-Economic development. Barriers to Entrepreneurship. Case studies.

Module 3:
Entrepreneurial Pursuits and Human Activities; nature, purpose and pattern of Human activities: Economic and non-economic, need for innovation. Creativity. Case studies

Module 4:
Entrepreneurial Values, Attitudes and Motivation-Meaning and concept. Developing entrepreneurial Motivation -concept and process of achievement motivation. Leadership, Communication and influencing ability. Success stories.

Module 5:
Enterprise and Environment : Environmental function, Critical factors for launching of a new enterprise, Understanding a market, Competitive analysis of the market.

Suggested Readings:

Online course through massive open online classes (MOOC), classroom learning through an experienced facilitator/faculty on campus (games, video, and practical experience

1. Vasanta Desai: Dynamics of entrepreneurial development and management;
2. Vasanta Desai: Entrepreneurial development;
3. Peter F. Drucker: Innovation and development;
4. M.V. Deshpande: Entrepreneurship of small scale industries;
5. Balakrishnan, G. Financing of small scale industries.

Semester IV **B.Tech.(Computer Science & Engineering)**

MAT 107 : DISCRETE MATHEMATICAL STRUCTURES

3L+1T+0P+3.5C **MM: 100**

Module 1: FORMAL LOGIC - Statement, Symbolic Representation and Tautologies, Quantifiers, Predicator and validity, Normal form. Propositional Logic, Predicate Logic, Logic Programming and Proof of correctness.

Module 2: PROOF, RELATION AND ANALYSIS OF ALGORITHM TECHNIQUES FOR THEOREM PROVING - Direct Proof, Proof by Contra position, Proof by exhausting cares and proof by contradiction, principle of mathematical induction, principle of complete induction. Recursive definitions, solution methods for linear, first-order recurrence relations with constant coefficients.

Module 3: GRAPH THEORY - Graphs - Directed and Undirected, Eulerian chains and cycles Hamiltonian chains and cycles, Trees, chromatic number, connectivity and other graphical parameters Applications. Polya's Theory of enumeration and its applications.

Module 4: SETS AND FUNCTIONS - Sets, relations, functions, operations, equivalence relations, relation of partial order, partitions, binary relations. Transforms: Discrete Fourier and Inverse Fourier Transforms in one and two dimensions, discrete Cosine transform.

Module 5: MONOIDS AND GROUPS - Groups, Semi groups and Monoids cyclic semi graphs and sub monoids, Subgroups and cosets. Congruence relations on semi groups. Morphism, Normal sub groups. Structure off cyclic groups, permutation groups and dihedral groups elementary applications in coding theory.

Text/Reference Books:

1. C.l.Liu; elements of Discrete Mathematics Tata McGraw Hill publishing Company Ltd., 2000
2. Richard johnsonbaugh disvrete mathematics prearson Asia 2001.
3. John Truss: Discrete Mathematics for Computer Scientists, Pearson Education, Asia, 2001.
4. Robert J.Mc Eliece: Introduction to Discrete Mathematics, Tata Mc. Graw Hill, India.
5. Lipschutz: Discrete Mathematics, Tata Mc. Graw Hill India.
6. Kenneth H. Rosen, Discrete mathematics and Applications, Tata Mc. Graw Hill

Semester IV **B.Tech.(Computer Science & Engineering)**

MAT 108 : STATISTICS AND PROBABILITY THEORY

3L+1T+0P+3.5C **MM: 100**

Module 1: INTRODUCTION - Sample space, Events, Algebra of events, Bayes' Rule, Bernoulli Trials.

Probability Distribution and Probability Densities: Bernoulli, Binomial, Poisson, Normal, rectangular and exponential distributions and their PDFs. Moments and MGFs for above distributions.

Module 2: DISCRETE RANDOM VARIABLES - Random Variables and their event space, probability mass function. Distribution Functions. Probability Generating Function. Expectations: Moments, Computation of mean Time to failure. Bernoulli & Poisson Processes.

Module 3: QUEUING THEORY - Pure birth, Pure Death and Birth-Death Processes, mathematical Models for M/M/I, M/M/N, M/M/S and M/M/S/N/ queues.

Module 4: DISCRETE PARAMETER MARKOV CHAINS - M/G/I Queuing Model, Discrete Parameter Birth-Death Process.

Module 5: NETWORK OF QUEUES - Open Queuing Networks. Correlation & Regression: Linear regression, Method of least squares, Normal regression and correlation Analysis.

Text/Reference Books:

1. Dr. Jain, Dr. Mangal Maheshwari, Mr. Praveen Deora “Statistic and Probability Theory”. Dhanpat Rai.
2. Probability, Statistics & Random Process By T. Veerajan, TMH
3. Fundamental of Mathematical Statistics By S.C.Gupta and V.K. Kapoor, Sultanchand & sons.
4. Statistics and Probability Theory By Jain & Rawat ,CBC
5. Statistics and Probability Theory by Schaum’s, T.M.

Semester IV **B.Tech.(Computer Science & Engineering)**

BEC 402 : MICROPROCESSOR AND INTERFACING

3L+0T+0P+3C **MM: 100**

Module1: INTRODUCTION TO MICROPROCESSOR-Overview of microprocessor structure and its operation, Microprocessor evaluation and its types, Address bus , Data bus, Control bus, Demultiplexing and buffering of system bus, peripheral devices and memory organization.

Module 2: 8085 MICROPROCESSOR - 8085 MPU, Pins and Signals, Microprocessor Architecture, internal data operations and Registers, Memory mapped I/O and Peripheral mapped I/O, 8085 Microprocessor Programming model, Interrupts of 8085, Addressing modes of 8085.

Module 3: ASSEMBLY LANGUAGE PROGRAMMING USING 8085 - Instruction set, Classification of instructions, Programming technique, Assembly language programs involving logical, Branch & Call instructions, sorting, evaluation of arithmetic expressions, string manipulation, Machine cycle, T-state, Timing Diagram.

Module 4: MICROPROCESSOR SYSTEM PERIPHERAL AND INTERFACE - Introduction to interfacing, 8155, 8255, 8253, 8257, 8259, 8279, DMA Controller, A/D Conversion, Memory and Keyboard interface.

Module 5: 8086-MICROPROCESSOR - 8086- Pins and Signals, Internal architecture , 8086 system configuration and timing, minimum and maximum mode, memory segmentation, Addressing modes of 8086, Instructions set of 8086, Interrupts of 8086.

Text/Reference Books:

1. Microprocessor Architecture, Programming and application with the 8085 by Ramesh Gaonkar, Wiley.
2. Introduction to Microprocessor by B. Ram.
3. Microprocessor Interfacing, programming and hardware by D. V. Hall, TMH.
4. Fundamental of Microprocessor, Uday kumar, Pearson.
5. Microprocessor 8085 and its Interfacing, Sunil kumar, PHI

Semester IV **B.Tech (Computer Science & Engineering)**

BEC 405 ANALOG COMMUNICATIONS

3L-1T-0P-3.5C **MM: 100**

MODULE 1: INTRODUCTION- Elements of Communication System and its Limitations, Mismatch between Signal & Channel- Modification of Channel or Modification of Signal, Modulation Benefits and Application, An Overview of Different types of Modulations- Analog & Digital, In Analog- Amplitude & Angle (Frequency & Phase) Modulation **Amplitude (Linear) Modulation**: Generation and Detection of AM, DSB, SSB and VSB, Carrier Acquisition, AM Transmitter and Receiver, Time domain and frequency domain description

MODULE 2: ANGLE MODULATIO - Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM.

MODULE 3: NOISE - Noise in Analog communication System-Resistor noise, Networks with reactive elements, Noise temperature, Noise bandwidth, effective input noise temperature, Noise figure. Noise figure & equivalent noise temperature in cascaded circuits. Calculation of signal-to-noise ratio in SSB-SC, DSB-SC, DSB with carrier, Noise calculation of square law demodulator & envelope detector. Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis

MODULE 4: TRANSMITTERS - Radio Transmitter - Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter. **RECEIVERS** : Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

MODULE 5: PULSE MODULATION - Time Division Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM

Text/Reference Books:

1. Principles of Communication Systems - Simon Haykin, John Wiley
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Communication Systems Second Edition – R.P. Singh, SP Sapre, TMH, 2007.
4. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006

Semester IV **B.Tech.(Computer Science & Engineering)**

BCS 401 : DATABASE MANAGEMENT SYSTEMS

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION - Database Systems versus File Systems, View of Data, Data Models, database languages, Database Users and Administrators. Transaction Management, Decision Support Systems, Components of a Database management System. Distributed Processing and Client- Server Architecture. Entity-Relationship Model – Basic Concepts, Constraints, Keys, Design Issues, E-R Diagrams.

Module 2: RELATIONAL MODEL - Structures of relational databases, Integrity Constraints, Logical database Design, Tables, Views, Data Dictionary. Relational Algebra, Relational Calculus. SQL – Basic Structures, Query Handling, Embedded SQL, Open Database Connectivity (ODBC), Java Database Connectivity (JDBC), Triggers, Security and Authorization. Query By Example (QBE), User Interfaces and Tools, Forms and Graphical User Interfaces. Report Generators. Overview of Relational Query Optimization.

Module 3: RELATIONAL DATABASE DESIGN - Functional Dependencies, Multi-valued Dependencies, Normal Forms, Decomposition into Normalized Relations, Physical Database Design – File Structures. Object-Relational Databases – Nested Relations, Complex Data types, Object-Relational Features in SQL:1999.

Module 4: INTERNET DATABASES - World Wide Web, Client Side Scripting and Applets, Web Servers and Sessions, Services, Server Side Scripting. XML – Structure of XML Data, XML Document Schema, XQuery, Storage of XML Data, XML Applications.

Module 5: ADVANCED TOPICS - Fundamental Concepts of Transaction Management, XConcurrency Control, Recovery Systems, Data Analysis and OLAP. Introduction to Data Mining, Data Farming, Data Warehousing, Spatial and Geographic Databases, Temporal databases a,d Multimedia Databases.

Text / Reference Books:

1. Date C J, " An Introduction to Database Systems", Addision Wesley
2. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
3. Elmasri, Navathe, "Fudamentals of Database Systems", Addision Wesley
4. Leon & Leon,"Database Management Systems", Vikas Publishing House
5. Bipin C. Desai, " An Introduction to Database Systems", Gagotia Publications
6. Majumdar & Bhattacharya, "Database Management System", TMH (14)
7. D.Ulman, "Principles of Database and Knowledge base System", Computer Science Press.

Semester IV **B.Tech.(Computer Science & Engineering)**

BCS 402 : SOFTWARE ENGINEERING

3L+1T+0P+3.5C **MM:100**

Module I: INTRODUCTION: Introduction to software Engineering, Software characteristics, Software components, Software applications, Software Engineering Principles, Software metrics and measurement, monitoring and control. Software development life-cycle, Water fall model, prototyping model, Incremental model, Iterative enhancement Model, Spiral model.

Module II: SOFTWARE REQUIREMENT SPECIFICATION: Requirements Elicitation Techniques, Requirements analysis, Models for Requirements analysis, requirements specification, requirements validation.

Module III: SYSTEM DESIGN: DESIGN PRINCIPLES: Problem partitioning, abstraction. Top down and bottom up – design, structured approach. Functional versus object oriented approach of design, design specification, Cohesiveness and Coupling. Overview of SA/SD Methodology, structured analysis, data flow diagrams, extending DFD to structure chart.

Module IV: TESTING: Verification and validation, code inspection, test plan, test case specification. Level of testing: Unit, Integration Testing, Top down and bottom up integration testing, Alpha and Beta testing, System testing and debugging. functional testing, structural testing, Software testing strategies. Software Maintenance: Structured Vs unstructured maintenance, Maintenance Models, Configuration Management, Reverse Engineering, Software Re-engineering

Module V: SOFTWARE PROJECT MANAGEMENT: Project planning and Project scheduling. Software Metrics: Size Metrics like LOC, Token Count, Function Count. Cost estimation using models like COCOMO. Risk management activities. Software Reliability and Quality Assurance: Reliability issues, Reliability metrics, reliability models, Software quality, ISO 9000 certification for software industry, SEI capability maturity model.

Text / Reference Books:

1. R.S. Pressman, Software Engineering: A Practitioner's Approach, McGraw-Hill, Ed 7, 2010.
2. P. Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House, Edition 3, 2011.
3. R. Mall, Fundamentals of Software Engineering, Prentice-Hall of India, 3rd Edition, 2009.
4. I. Sommerville, Software engineering (9th edition), Addison Wesley, 2010

Semester IV **B.Tech.(Computer Science & Engineering)**

MGT 110 : GENERAL APTITUDE

0L-0T-2P+1C **MM 100**

MODULE-1 LEVEL 1:- Number System:-Number Series, HCF and LCM of Numbers, Fractions and Decimals, Square Root and Cube Roots, Indices and Surds, Simplification and Approximation,

MODULE-2-LEVEL-2 Problems on Ages and Numbers Percentage, Profit, Loss and Discount, Average, Ratio and Proportion, Time, Work and Wages, Pipes and Cisterns, Simple Interest, Compound Interest,

MODULE-3-LEVEL-3 Growth and Depreciation, Time and Distance, Trains, Boats and Streams, Races, Clocks, Calendar

MODULE-4 : LEVEL-4: Area of Plane Figures, Volume and Surface Area of Solid Figures Elementary Algebra, Linear Equations, Quadratic Equations and In-equation, Progression,

MODULE-5: LEVEL-5: Permutation and Combination, Probability, Geometry, Trigonometry, **D**ata Interpretation, Data Sufficiency

Text/Reference Books:

1. R. S. Agarwal- Aptitude Mathematics
2. Mathuria- Quake Mathematics

Semester IV **B.Tech.(Computer Science & Engineering)**

BEC 409 : ANALOG COMMUNICATION LAB

0L+0T+2P+1C **MM:100**

1. Harmonic analysis of a square wave of a modulated wave form.
2. Observe the Amplitude modulated wave form & measure modulation index. Demodulation of AM signal.
3. Generation & Demodulation of DSB – SC signal.
4. Modulate a sinusoidal signal with high frequency carrier to obtain FM signal. Demodulation of the FM signal.
5. To observe the following in a transmission line demonstrator kit:
   (a) The propagation of pulse in non-reflecting transmission line.
   (b) The effect of losses in transmission line.
   (c) Transmission with standing waves on a Transmission line.
   (d) The resonance characteristics of a half-wave length long X-mission line.
6. (a) To observe the operation of sampling and sample & hold circuits.
   (b) To study the effect of sampling time (sampling pulse width).
   (c) To study the effects of changing the sampling frequency & observing aliasing phenomena.
7. To study & observe the operation of a super heterodyne receiver.
8. To study & observe the amplitude response of automatic gain controller (AGC).
9, 10. PAM, PWM & PPM: Modulation and demodulation.

Semester IV **B.Tech.(Computer Science & Engineering)**

BCS 404 : DATABASE MANAGEMENT SYSTEM LAB

0L+0T+2P+1C **MM:100**

Student can use My Sql (preferred open source DBMS) or any other Commercial DBMS tool (MS-Access / ORACLE) at backend and C++ (preferred) VB/JAVA at front end.

1. (a) Write a C++ program to store students records (roll no, name, father name) of a class using file handling.(Using C++ and File handling).

(b) Re-write program 1, using any DBMS and any compatible language.(C++/MySQL) (VB and MS-Access)

2. Database creation/ deletion, table creation/ deletion.

(a) Write a program to take a string as input from user. Create a database of same name. Now ask user to input two more string, create two tables of these names in above database.

(b) Write a program, which ask user to enter database name and table name to delete. If database exist and table exist then delete that table.

3. Write a program, which ask user to enter a valid SQL query and display the result of that query.

4. Write a program in C++ to parse the user entered query and check the validity of query.
(Only SELECT query with WHERE clause)

5 - 6. Create a database db1, having two tables t1 (id, name, age) and t2 (id, subject, marks).

(a) Write a query to display name and age of given id (id should be asked as input).

(b) Write a query to display average age of all students.

(c) Write a query to display mark-sheet of any student (whose id is given as input).

(d) Display list of all students sorted by the total marks in all subjects.

7 - 8. Design a Loan Approval and Repayment System to handle Customer's Application for Loan and handle loan repayments by depositing installments and reducing balances.

9 -10. Design a Video Library Management System for managing issue and return of Video tapes/CD and manage customer's queries.

Semester IV **B.Tech.(Computer Science & Engineering)**

BEC 407 : MICROPROCESOR LAB

0L+0T+2P+1C **MM: 100**

1. Study the hardware, functions, memory structure and operation of 8085 microprocessor kit.
2. Program to perform integer division: (i) 8-bit by 8-bit (ii) 16-bit by 8-bit.
3. Transfer of a block of data in memory to another place in memory in the direct and reverse order.
4. Searching a number in an array and finding its parity.
5. Sorting of array in: (i) Ascending (ii) Descending order
6. Programme to perform following conversion: (i) BCD to ASCII (ii) BCD to Hexadecimal
7. Programme to multiply two 8-bit numbers.
8. Programme to generate and sum 15 fibanocci numbers.
9. Programme for rolling display of message “INDIAN”.
10. To insert a number at correct place in a sorted array.
11. Serial and Parallel data transfer on output port 8155 & 8255 & designing of disco light, running light, and sequential lights on off by above hardware.
12. Generation of different waveform on 8253/ 8254 programmable timer.

Semester IV **B.Tech.(Computer Science & Engineering)**

BCS 405 : SOFTWARE SYSTEM DESIGN LAB

0L+0T+2P+1C **MM:100**

In this lab first 8 experiments are to practice software engineering techniques. Use any open source CASE tool. Many of them are available at www.sourceforge.net. You can choose any other CASE tool, as per choice.

Language: C++ / JAVA Design Approach : Object Oriented

These designing can be done on any automation system e.g. library management system, billing system, payroll system, bus reservation system, gas agency management system, book-shop management system, students management system.

1. Do feasibility study?
2. Document all the requirements as specified by customer in Software Requirement Specification
3. Design sequence diagrams for project
4. Design Collaboration diagram
5. Design Data Flow Diagram for the project
6. Design Entity Relation Diagram for the project
7. Design Class diagram
8. Design at least 10 test cases for each module.
9. -10: Code and test the project, which you have designed in last 8 labs.

Semester IV **B.Tech.(Computer Science & Engineering)**

MGT 202 : BASIC PROGRAM IN ENTREPRENEURSHIP

0L+0T+2P+1C **MM:100**

Objective: The goal of this Program is to provide a space and platform for discovery, both self – discovery and opportunity discovery. Students will discover their strengths in terms of an entrepreneurial founding team and learn basics such as opportunity discovery, prototyping, business plans, challenges etc.

Module 1: Identification and classification of ideas. Entrepreneurial opportunities, environment scanning, Market assessment.

Module 2: Clarifying the Value Proposition, Product and Service; Market segmentation, Product Life cycle; BCG Matrix.

Module 3: Environmental Scanning and SWOT analysis; Components of an ideal business plan – market plan, financial plan, operational plan, and HR plan.

Module 4: Concept to Creation, Teething Problems of startup, Organizing and Marketing a Startup Selling on the web, launching e-commerce , Starting and growing an Enterprise, Growth Path

Module 5: Students have to prepare a detailed business plan selecting a product(s), Presentation of such business plans and submission after necessary corrections suggested by subject faculty

References:

Online Courses through MOOC, Classroom learning through an experienced Facilitator/Faculty on campus (Games, Exercises, Videos, and Practical Experiences)

1. Tendon ,C: Environment and Entrepreneur; Cliugh Publications, Allahabad.
2. Siner A David: Entrepreneural Megabuks; John Wiley and Sons, New York.
3. Srivastava S. B: A Practical Guide to Industrial Entrepreneurs; Sultan Chand and Sons, New Delhi.
4. Prasanna Chandra: Protect Preparation, Appraisal, Implementation; Tata McGraw Hill. New Delhi.
5. Paudey I.M: Venture Capital - The Indian Experience; Prentice Hall of India. New Delhi
6. Holt: Entrepreneurship-New Venture Creation; Prentice Hall of India. New Delhi

Semester V **B.Tech. (Computer Science & Engineering)**

BCS 501 OPERATING SYSTEMS

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION - OS Concepts – Evolution of OS, OS Structures- Kernel, Shell, General Structure of MSDOS, Windows 2000, Difference between ANSI C and C++.Introduction and need of operating system, layered architecture/logical structure of Operating system, Type of OS, operating system as resource manager and virtual machine, OS services, BIOS, System Calls/Monitor Calls, Firmware- BIOS, Boot Strap Loader.

Module 2: PROCESS MANAGEMENT - Process & Threads – Process States - Process Control Block. Process Scheduling – Operations on Processes, Threads, CPU Scheduler – Preemptive and Non- Preemptive; Dispatcher, Scheduling Criteria, Concurrent Processes, Co-operating Processes, Precedence Graph, Hierarchy of Processes, Critical Section Problem. Two process solution, Synchronization Hardware, Semaphores – Deadlock- detection, handling, prevention, avoidance, recovery, Starvation, Critical Regions, Monitors, Inter process communication.

Module 3: MEMORY MANAGEMENT - Objectives and functions, Simple Resident Monitor Program (No design), Overlays – Swapping; Schemes – Paging – Simple, Multi-level Paging; Internal and External Fragmentation; Virtual Memory Concept, Demand Paging - Page Interrupt Fault, Page Replacement Algorithms; Segmentation – Simple, Multi-level, Segmentation with Paging, Cache Memory.

Module 4: INTER PROCESS COMMUNICATION:- 1.Virtual Memory– Concept, virtual address space, paging scheme, pure segmentation and segmentation with paging scheme hardware support and implementation details, memory fragmentation, 2: Overview of IPC Methods, Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores. Interprocess Communication – 3: Shared Memory, Client-Server Properties, Stream Pipes, Passing File Descriptors, An Open Server-Version 1, Client-Server Connection Functions.

Module 5: INFORMATION MANAGEMENT - Files and Directories – Directory Structure – Directory Implementation – Linear List - Hash Table. Device Management: Dedicated, Shared and Virtual Devices - Serial Access Devices, Direct Access Devices, Direct Access Storage Devices – Channels and Control Units – Disk Scheduling methods.

Text/Reference Books:

1. Operating Systems Concepts – Silberschatz, Galvin, Wiley Publications (2008)
2. Modern Operating Systems - Andrew S. Tenenbaum, Pearson Education Asia / PHI (2005)
3. UNIX System Programming Using C++,by Terrence Chan: Prentice Hall India, 1999.
4. Advanced Programming in UNIX Environment, by W. Richard Stevens: 2nd Ed, Pearson Education, 2005.
5. Operating Systems – William Stallings, Pearson Education Asia (2002)

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 502 DESIGN & ANALYSIS OF ALGORITHMS

3L+1T+0P+3.5C **MM :100**

Module 1: BACKGROUND - Algorithm Complexity and Order Notations and Sorting Methods. DIVIDE AND CONQUER METHOD: Binary Search, Merge Sort, Quick sort and strassen's matrix multiplication algorithms. GREEDY METHOD: Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Trees.

Module 2: DYNAMIC PROGRAMMING - Matrix Chain Multiplication. Longest Common Subsequence and 0/1 Knapsack Problem. BRANCH AND BOUND: Traveling Salesman Problem and Lower Bound Theory. Backtracking Algorithms and queens problem.

Module 3: PATTERN MATCHING ALGORITHMS - Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms.

ASSIGNMENT PROBLEMS: Formulation of Assignment and Quadratic Assignment Problem.

Module 4: RANDOMIZED ALGORITHMS - Las Vegas algorithms, Monte Carlo algorithms, randomized algorithm for Min-Cut, randomized algorithm for 2-SAT.

Problem definition of Multi commodity flow, Flow shop scheduling and Network capacity assignment problems.

Module 5: PROBLEM CLASSES NP, NP-HARD AND NP-COMPLETE - Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems. Cook's Theorem. Proving NP-Complete Problems - Satisfiability problem and Vertex Cover Problem. Approximation Algorithms for Vertex Cover and Set Cover Problem

Text/Reference Books:

1. Coreman, Rivest, Lisserson, : “Algorithm", PHI.
2. Basse, "Computer Algorithms: Introduction to Design & Analysis", Addision Wesley.
3. Horowitz & Sahani, "Fundamental of Computer Algorithm", Galgotia.
4. Motwani and Raghavan "Randomized Algorithms", Cambridge University Press
5. Preparata and Shamos "Computational Geometry", Springer Verlag
6. Mehlhorn "Data Structures and Algorithms: 1, Searching and Sorting", Springer Verlag EATCP

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 503 THEORY OF COMPUTATION

3L+1T+0P+3.5C **MM:100**

Module 1: FINITE AUTOMATA & REGULAR EXPRESSION - Basic Concepts of finite state system, Deterministic and non-deterministic finite automation and designing regular expressions, relationship between regular expression & Finite automata minimization of finite automation mealy & Moore Machines.

Module 2: REGULAR SETS OF REGULAR GRAMMARS - Basic Definition of Formal Language and Grammars. Regular Sets and Regular Grammars, closure proportion of regular sets, Pumping lemma for regular sets, decision Algorithms for regular sets, Myhell_Nerod Theory & Organization of Finite Automata.

Module 3: CONTEXT FREE LANGUAGES& PUSHDOWN AUTOMATA - Context Free Grammars – Derivations and Languages – Relationship between derivation and derivation trees – ambiguity – simplification of CEG – Greiback Normal form – Chomsky normal forms – Problems related to CNF and GNF Pushdown Automata: Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Pushdown automata and CFL - pumping lemma for CFL - Applications of pumping Lemma.

Module 4: TURING MACHINES - Turing machines – Computable Languages and functions – Turing Machine constructions – Storage in finite control – multiple tracks – checking of symbols – subroutines – two way infinite tape. Undecidability: Properties of recursive and Recursively enumerable languages – Universal Turing Machines as an undecidable problem – Universal Languages – Rice's Theorems.

Module 5: LINEAR BOUNDED AUTOMATA CONTEXT SENSITIVE LANGUAGE - Chomsky Hierarchy of Languages and automata, Basic Definition& descriptions of Theory & Organization of Linear bounded Automata Properties of context-sensitive languages.

Text/Reference Books:

1. Hopcroft, Ullman, "Introduction to Automata Theory, Language and Computation",Nerosa Publishing House
2. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science (Automata,Languages and Computation)", PHI
3. Martin J. C., "Introduction to Languages and Theory of Computations", TMH
4. Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education
5. Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", PHI

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 504 COMPUTER ORGANIZATION AND DESIGN

3L+0T+0P+3C **MM:100**

Module 1: BASIC ORGANIZATION OF COMPUTERS - Block level description of the functional units as related to the execution of a program; Fetch, decode and execute cycle.

Module 2: MACHINE INSTRUCTIONS - Instruction set architectures, Assembly language programming, addressing modes, instruction cycles, registers and storage, addressing modes; discussions about RISC versus CISC architectures; Inside a CPU:

Module 3: Information representation, Floating point representation (IEEE 754), computer arithmetic and their implementation; Fixed-Point Arithmetic: Addition, Subtraction, Multiplication and Division, Arithmetic Logic Units control and data path, data path components, design of ALU and data path, controller design; Hardwired and Micro programmed Control

Module 4: memory technology, static and dynamic memory, Random Access and Serial Access Memories, Cache memory and Memory Hierarchy, Address Mapping, Cache updation schemes, Virtual memory and memory management unit.

Module 5: I/O SUBSYSTEMS - Input-Output devices such as Disk, CD-ROM, Printer etc.; Interfacing with IO devices, keyboard and display interfaces; Basic concepts Bus Control, Read Write operations, Programmed IO, Concept of handshaking, Polled and Interrupt-driven I/O, DMA data transfer; Pipeline Processing, Instruction and Arithmetic Pipeline, Pipeline hazards and their resolution.

Text / Reference Books:

1. Computer Organization by V. Carl Hamacher, Safwat G. Zaky and Zvonko G. Vranesic , McGraw-Hill series (2002)
2. Computer Organization and Design, by David Patterson and John Hennessey, ” Elsevier. 2008. Computer System Architecture by Mano, M.M.,, Prentice Hall of India, New Delhi, 1992
3. Computer Systems Design and Architecture (2nd Edition) by Vincent P. Heuring and Harry F. Jordan (Dec 6, 2003)
4. Computer Architecture and Organization, by Hayes, J.P.1998,McGraw-Hill

Semester V **B.Tech.(Computer Science & Engineering)**

BEC 502 MICRO CONTROLLER AND EMBEDDED SYSTEMS

3L+0T+0P+3C **MM: 100**

Module 1: INTRODUCTION TO VARIOUS MICROCONTROLLER - Overview of Embedded System: Definition, Design Challenges and Characteristics, Difference between microprocessor, microcontroller, introduction of various microcontrollers, 8051 By Intel, PIC by Microchip, AVR by ATMEL, ARM by ARM, MSP430 by Texas, Use and application of 8051 .

Module 2: 8051 MICRO CONTROLLER - 8051 Microcontroller: Architecture, Addressing modes, I/O Port Programming, Single bit, Instructions and Programming

Module 3 : 8051 PROGRAMMING - Interrupt Programming, Timers Programming, serial port Programming and interrupt programming in Assembly and C .

Module 4 : ARM PROCESSORS - ARM Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector table, Core Extensions, Instruction Set, Introduction to Thumb Instruction Set (Writing Programs not included in the theory Course)

Module 5 : APPLICATIONS OF EMBEDDED SYSTEMS - Concepts of system-on-chip, How modern-day system-on-chip (SoC) microcontrollers can Implement a whole signal chain. Applications of Embedded systems: Energy meters, Smoke detectors, Data acquisition system, wired sensor network, and wireless sensor networks with Chipcon RF interface.

Text/Reference Books:

1. Andrew N. Sloss et.al. ARM System Developers Guide, ELSEVIER
2. Muhammad Ali Mazidi et.al., The 8051 Microcontroller & Embedded Systems, Pearson
3. Embedded System Design, A Unified Hardware/Software Introduction, Frank
1. Vahid / Tony Givargis, 2006 reprint, John Wiley Student Edition.
4. Muhammad Ali Mazidi et.al., The PIC Microcontroller, Pearson

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 506 OPERATING SYSTEM LAB

0L+0T+2P+1C **MM:100**

1. Shell programming
   - command syntax
   - write simple functions
   - basic tests
2. Shell programming
   - loops
   - patterns
   - expansions
   - substitutions

3. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
4. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)

5. Write C programs to simulate UNIX commands like ls, grep, etc.
6. Given the list of processes, their CPU burst times and arrival times,display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time

7. Given the list of processes, their CPU burst times and arrival times,display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
8. Implement the Producer – Consumer problem using semaphores.

9. **Implement some memory management schemes – I** for eg Free space is maintained as a linked list of nodes with each node having the starting byte address and the ending byte address of a free block. Each memory request consists of the process-id and the amount of storage space required in bytes. Allocated memory space is again maintained as a linked list of nodes with each node having the process-id, starting byte address and the ending byte address of the allocated space.
10. **Implement some memory management schemes – II** for eg when a process finishes (taken as input) the appropriate node from the allocated list should be deleted and this free disk space should be added to the free space list. [Care should be taken to merge contiguous free blocks into one single block. This results in deleting more than one node from the free space list and changing the start and end address in the appropriate node]. For allocation use first fit, worst fit and best fit.

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 507 COMPUTER ARCHITECTURE LAB

0L+0T+2P+1C **MM:100**

This lab will be based on assembly programming on of RISC processor simulator SPIM. SPIM simulator is available at site http://pages.cs.wisc.edu/~larus/spim.html.

1. Read an integer from the keyboard and print it out if (n => n_min AND n <= n_max).
2. Read an integer from the keyboard and print out the following as per switch-case statement

    Switch (n)

    { n <= 10 print "not a lot"

    n == 12 print "a dozen"

    n == 13 print "a baker's dozen"

    n == 20 print "a score"

    n >= 100 print "lots and lots"

    n != 42 print "integer"

    Otherwise print "you have the answer!"

3. Read a string from the keyboard and count the number of letters. Use the equivalent of following for loop to count number of chars.

    for (s1=0; str[s1] != '\n'; ++s1)

4. Print out a line of characters using simple procedure call.
5. Print out a triangle of characters using recursive procedure call.
6. Print factorial of a number using recursion.
7. Print reverse string after reading from keyboard.
8. Print a string after swapping case of each letter.
9. Print an integer in binary and hex.
10. Implement bubble sort algorithm.
11. Print Pascal Triangle of base size 12.
12. Evaluate and print Ackerman function.

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 508 PROGRAMMING IN JAVA LAB

0L+0T+2P+1C **MM:100**

Programs in JAVA:

1. Creation of classes and use of different types of functions.
2. Count the number of objects created for a class using static member function.
3. Write programs on interfaces.
4. Write programs on packages.
5. Write programs using function overloading.
6. Programs using inheritance
7. Programs using IO streams.
8. Programs using files.
9. Write a program using exception handling mechanism.
10. Programs using AWT
11. Programs on swing.
12. Programs using JDBC

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 509 SKILL DEVELOPMENT LAB

(PYTHON PROGRAMMING)

0L+0T+2P+1C **MM:100**

Programs in Python:

1. Python Program to print “hello world”.
2. Some basic programs to be familiar with syntax of python programming.
3. Python Program to Display Calendar.
4. Python Program to Display Fibonacci Sequence Using Recursion.
5. Python Program to Find Sum of Natural Numbers Using Recursion
6. Python Program to Find Factorial of Number Using Recursion.
7. Python Program to Convert Decimal to Binary Using Recursion.
8. Python Program to Add Two Matrices.
9. Python Program to Transpose a Matrix.
10. Python Program to Multiply Two Matrices.
11. Python Program to Check Whether a String is Palindrome or Not.
12. Python Program to Remove Punctuations From a String.
13. Python Program to Sort Words in Alphabetic Order.
14. Python Program to Merge Mails.
15. Python Program to Find the Size (Resolution) of Image.
16. Python Program to Find Hash of File.

Semester V **B.Tech.(Computer Science & Engineering)**

MGT 203 FOUNDATION PROGRAM IN ENTREPRENEURSHIP

0L+0T+2P+1C **MM:100**

Objective: This program will acquire the students with the skills required to take an idea to market.

Module I: Customer Development and Experience , understanding consumer behavior and needs , designing the product/service according to the market needs , how to create an experience and not just a service.

Module II: Project Formulation – Steps involved in setting up a Business, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal.

Module III: Small, Medium And Large Industrial Sectors, Industrial Potential, Demand And Resource Based Industries, Service Sector, corporate entrepreneurship, entrepreneurship and technocrat entrepreneurship.

Module IV: Sources of finance for enterprises, angel investors and venture capitalists, banks and government institutions, policies for start-ups.

Module V.: Stakeholders Validation – test angel investor interest in the solution, pitching to others (investors, partners, potential key hires) , obtaining seed funding and making the first key hires , validate interest for partners , channels.

References: Online courses through MOOC.

1. Tendon ,C: Environment and Entrepreneur; Cliugh Publications, Allahabad.
2. Siner A David: Entrepreneural Megabuks; John Wiley and Sons, New York.
3. Srivastava S. B: A Practical Guide to Industrial Entrepreneurs; Sultan Chand and Sons, New Delhi.
4. Prasanna Chandra: Protect Preparation, Appraisal, Implementation; Tata McGraw Hill. New Delhi.
5. Paudey I.M: Venture Capital - The Indian Experience; Prentice Hall of India. New Delhi
6. Holt: Entrepreneurship-New Venture Creation; Prentice Hall of India. New Delhi
7. World Bank Development report 2015-16.
8. World Bank “doing Business” 2014, 2015, 2016.
9. Govt. of India “Economic survey 2015-16”, Oxford University Press
10. UNDP-Human Development Report 2015-16.

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 511 PROGRAMMING IN JAVA

3L+0T+0P+3C **MM:100**

Module 1: JAVA - Introduction to Object Orientated Programming, Abstraction, Object Oriented Programming Principles, Features of JAVA, Introduction to Java byte code, Java Virtual machine. PROGRAM ELEMENTS: Primitive data types, variables, assignment, arithmetic, short circuit logical operators, Arithmetic operators, bit wise operators, relational operators, Boolean logic operators, the assignment operators, operator precedence, Decision and control statements, arrays.

Module 2: CONTROL STATEMENTS - Java's Selection Statements, if statement, switch statement, Iteration Statements, while, do-while, for, for-each, Nested Loops, Jump Statements, Using break, Using continue, return.

Module 3: OBJECTS AND CLASSES - Objects, constructors, returning and passing objects as parameter, Nested and inner classes, Single and Multilevel Inheritance, Extended classes, Access Control, usage of super, Overloading and overriding methods, Abstract classes, Using final with inheritance.
PACKAGE AND INTERFACES: Defining package, concept of CLASSPATH, access modifiers, importing package, Defining and implementing interfaces.

Module 4: STRING HANDLING - String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class.
EXCEPTION HANDLING: Exception handling fundamentals, Exception types, uncaught exceptions, try, catch and multiple catch statements. Usage of throw, throws and finally .FILE HANDLING: I/O streams, File I/O.

Module 5: CONCURRENCY - Processes and Threads, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Joins, Synchronization. APPLET: Applet Fundamentals, using paint method and drawing polygons.

Text/Reference Books:

1. Herbert Schildt: JAVA 2 - The Complete Reference, TMH, Delhi
2. Deitel: How to Program JAVA, PHI
3. U.K. Chakraborty and D.G. Dastidar: Software and Systems – An Introduction, Wheeler Publishing, Delhi.
4. Joseph O'Neil and Herb Schildt: Teach Yourself JAVA, TMH, Delhi.

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 512 PROGRAMMING IN C#

3L+0T+0P+3C **MM:100**

Module 1: Introduction - The.NET Solution, The Building Block of the .NET Platform (CLR,CTS, andCLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table, An Overview of .NET Binaries (aka Assemblies), the Role of the Common Intermediate Language, The Role of .NET Type Metadata, The Role of the assembly Manifast, Compiling CIL to Platform – Specific Instructions, Understanding the Common Type System, Intrinsic CTS DataTypes, Understanding the Common Languages Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces, Increasing Your Namespace Nomenclature, Deploying the .NET Runtime.

Module 2: Building C# Applications - The Role of the Command Line Complier(csc.exe), Building C# Application using csc.exe Working with csc.exeResponse Files, Generating Bug Reports, Remaining g C# Complier Options, The Command Line Debugger (cordbg.exe) Using the, Visual studio .NETIDE, Other Key Aspects of the VS.NET IDE, C# "Preprocessor:" Directives

Module 3: C# Language Fundamentals - The Anatomy of Basic C# Class, Creating objects: Constructor Basics, The Composition of a C# Application, Default assignment and Variable Scope, The C# Member Initialization Syntax, Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System.

Module 4: Objects & Methods- Object, The System Data Types(and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing, Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understating Static Methods, Methods Parameter Modifies, Array Manipulation in C#, String Manipulation in C#,C# Enumerations, Defining Structures in C#, Defining Custom Namespaces.

Module 5: OOPS with C#- Forms Defining of the C# Class, Default Public Interface of a Type, C#'s Encapsulation Services, Creating Read-Only Fields, C#'s Inheritance Supports, The " Protected" Keyword, Nested Type Definitions, The C #'s Polymorphic Support, Casting

Text/Reference Books:

1. A Programmer's Introduction to C#, 2nd edition, Apress - Eric Gunnerson
2. Inside C#, 2nd edition, Microsoft Press- Tom Archer
3. Component-Based Development with Visual C# , M&T books - Ted Faison
4. C# Essentials, 2nd edition O'Reilly - Ben Albahari, Peter Drayton & Brad Merrill
5. C# 5.0 In a Nutshell: The Definitive Reference - Joseph Albahari & Ben Albahari

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 513 PROGRAMMING IN PYTHON

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION & OVERVIEW: - Introduction, What is Python, Origin, Comparison, Comments, Operators, Variables and Assignment, Numbers, Strings, Lists and Tuples, Dictionaries, if Statement, while Loop, for Loop and the range, Built-in Function, Files and the open() Built-in Function, Errors and Exceptions, Functions, Classes, Modules.
Syntex & styles: Statements and Syntax, Variable Assignment, Identifiers, Basic Style Guidelines, Memory Management, Python Application Examples.

Module 2: PYTHON OBJECTS:- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types.

Module 3: NUMBERS AND STRINGS:- Introduction to Numbers, Integers, Floating Point Real numbers, Complex Numbers, Operators, Built-in Functions. Sequences: Strings, Lists, and Tuples, Sequences, Strings, Strings and Operators, String-only Operators, Built-in Functions, String Built-in Methods, Special Features of Strings.

Module 4: LISTS:- Operators, Built-in Functions, List Type Built-in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples.
Conditionals and Loops:-if statement, else Statement, else if Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement, else Statement.

Module 5: FILES AND INPUT/OUTPUT:- File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules

Text/Reference Books:

1. Core Python Programming, Chun, J Wesley, 2nd Edition, Pearson,2010
2. Head First Python, Barry, Paul, 2nd Edition, O Rielly, 2010.
3. Learning Python, Lutz, Mark, 4th Edition, O Rielly, 2009.

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 514 CYBER CRIME & IT LAW

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION- Computers and its Impact in Society, Overview of Computer and Web Technology, Statistics of digital world, Need for Cyber Law, Cyber Jurisprudence at International and Indian Level, Indian IT act 2000, Indian IT act 2008 amendment, important amendment in IT act 2008

Module 2: CYBER LAW INTERNATIONAL PERSPECTIVES:- UN & International Telecommunication Union (ITU) Initiatives, Council of Europe: Budapest Convention on Cybercrimes, Asia-Pacific Economic Cooperation (APEC) , Organization for Economic Co-operation and Development (OECD),World Bank, Commonwealth of Nations

Module 3: CONSTITUTIONAL & HUMAN RIGHTS ISSUES IN CYBERSPACE:- Freedom of Speech and Expression in Cyberspace , Right to Access Cyberspace: Access to Internet , Right to Privacy. Right to Data Protection

Module 4: CYBER CRIMES & LEGAL FRAMEWORK: Definition, Cyber Crimes against Individuals, Institution and State, Hacking & cracking, Digital Forgery ,Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud, Cyber terrorism, Cyber Defamation, Different offences under IT Act, 2000, Cyber laws and law enforcement

Module 5: INTELLECTUAL PROPERTY ISSUES IN CYBER SPACE:- Interface with Copyright Law, Interface with Patent Law, Trademarks & Domain Names Related issues, domain squatting

Text/Reference Books:

1. Computer Law, Chris Reed & John Angel, OUP, New York, (2007).
2. Cyber Laws, Justice Yatindra Singh, Universal Law Publishing Co, New Delhi, (2012)
3. Legal Dimensions of Cyber Space, Verma S, K, Mittal Raman, Indian Law Institute, New Delhi, (2004)
4. Cyber Law, Jonthan Rosenoer, Springer, New York, (1997).
5. Information Technology Act, 2000, S. R. Bhansali, , University Book House Pvt. Ltd., Jaipur (2003).
6. Cyber Crimes and Law Enforcement, Vasu Deva, Commonwealth Publishers, New Delhi, (2003).

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 515 PRINCIPLES OF PROGRAMMING LANGUAGE

3L+0T+0P+3C **MM: 100**

Module 1: PROGRAMMING LANGUAGE - Definition, History, Features. Issue in Language Design: Structure and Operation of computer, Language Paradigms. Efficiency, Regularity. Issues in Language Translation: Syntax, Semantics, Stages analysis and synthesis, Parse Tree, CFG and BNF grammar.

Module 2: Specification and Implementation of Elementary and Structured Data Types. Type equivalence, checking and conversion. Array, List, Structure, Union.

Module 3: Sequence control with Expressions, Conditional Statements, Loops, Exception handling. Subprogram definition and activation, simple and recursive subprogram, subprogram environment. Parameter passing mechanism**.**

Module 4: Abstract Data type, information hiding, encapsulation, type definition. Static and Stack-Based Storage management. Fixed and Variable size heap storage management. Garbage Collection

Module 5: PARALLEL PROGRAMMING: Introduction, parallel processing and programming language, Threads, semaphore, monitor, message passing.

Text/Reference Books:

1. Concepts of Programming Language ,Robert W. Sebesta, Addison Wesley, pearson Education Asia, 1999.
2. Introduction to Computer Science, Ramon A. Mata-Toledo and Pauline K. Cushman, Mc Graw Hill International Edition.
3. Programming Languages, D. Appleby and JJ Vande Kopple: Tata Mc Graw Hill, India.
4. How to Program C, Deitel and Deitel, Addison Wesley, Pearson Education Asia, 1999.
5. Mastering C++, K.r. Venugopal, Rajkumar, T. Ravishankar, Tata Mc Graw Hill, India.

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 516 ADVANCE SOFTWARE ENGINEERING

3L+0T+0P+3C **MM: 100**

Module 1: SOFTWARE CONFIGURATION MANAGEMENT - SCM Process, Objects in Software configuration, Version control, Change control, Configuration audit, Status reporting, SCM standards .SOFTWARE QUALITY ASSURANCE: Quality Concepts, Quality Movement, SQA Activities and Formal Approaches to SQA.

Module 2: SOFTWARE TESTING AND DEBUGGING - Software Testing Fundamentals .Text Case Design ,White –Box Testing, Basis Path testing, Control Structure Testing, Black Box Testing and Testing for Specialized Environments, Architectures and Applications. Program Error, Debugging Process (Information Gathering, Fault Isolation, Fault Confirmation, Documentation, Fixing fault, Testing) Debugging Example.

Module 3: MANAGING TEAM - Understanding behavior and selecting right person for the job, Motivation, working in groups, decision making, leadership and organizational structures. INTERNATIONAL STANDARDS: Importance and defining software quality, ISO 9126, BS 6079 planning steps, ISO 12207 approach to software lifecycle data.

Module 4: WEB ENGINEERING - Attributes of Web-Based Applications. Process, Modeling activity, Analysis modeling for WebApps, Design- functional, information & interaction, testing WebApps- content, navigation, configuration, and performance testing.

Module 5: PROJECT MANAGEMENT FOR SPECIAL CLASSES OF SOFTWARE PROJECTS - Using CASE tools, CBSE, Re-engineering, forward engineering, client/server software engineering, outsourcing, Software project management standards. Change and Content Management of Web Engineering.

Text/Reference Books:

1. R. S. Pressman, Software Engineering: A Practitioners Approach, TMH

2. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software

Engineering, PHI

3. Pankaj Jalote, Software Engineering, Narosa Publication

Semester V **B.Tech.(Computer Science & Engineering)**

BCS 517 MANAGEMENT INFORMATION SYSTEM

3L+0T+0P+3C **MM: 100**

Module 1: Managing Information Systems in Organization: Introduction, Defination, Need of MIS, Managing in the Internet Era, Managing Information Systems in Organization-the IT interaction model, Challenges for the manager-what information to build?-how much to spend on information systems?-what level of capabilities should be created with information systems?-how centralized should the services be?-what security levels are required?-what is technology road map for the organization?

Module 2: Data and Information: Introduction, data and information- measuring data, information as a resource, information in organizational functions, types of information technology, types of information systems- transaction processing systems-management information systems

Module 3: Decision making and communication: Introduction, Decision making with MIS-Tactical decisions-operational decisions-strategic decisions, communication in organizations- types of communication- examples of communications in organizations- decision making with communication technology, Decision Support Systems: Introduction, Understanding DSS- MIS and DSS-Decision making-types of decisions, Analytics and Business Intelligence- BI techniques

Module 4: SCM, CRAM and International Systems: Introduction, Supply Chain Management Systems, Customer Relationships Management Systems, Challenges of Enterprise Systems Implementations-Managing the implementation, International Information Systems-Outsourcing and off-shoring

Module 5: Managing Social Media: Introduction, Social Dynamics of the Internet, Services of the Internet- Blogs-Social Networks, Technology of the Internet- Twitter-Rating-Tagging/folksonomies, Social issues-Media impact-Collaboration-Emergence of order, Social Networks in the Enterprise Managing IT Function: Introduction, Challenges of Managing the IT function- Modern IT environment-Centralization versus Decentralization-IT security-Technology selection, Vendor Management- vendor selection-vendor contracts and service levels-Ongoing relationship management- vendor retention or termination

Text/Reference Books:

1. Management Information Systems, Jawadekar, Tata McGraw Hill
3. Management Information Systems, Davis and Olson, Tata McGraw Hill
4. Analysis and Design of Information Systems, Rajaraman, Prentice Hall
5. Decision Support Systems and Intelligent Systems, Turban and Aronson, Pearson Education Asia
6. Management Information Systems, Schulthesis, Tata McGraw Hill
7. Management Information Systems - Sadagopan, Prentice Hall

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 601 COMPUTER-NETWORKS

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION - OSI, TCP/IP and other networks models, Network Topologies WAN, LAN, MAN.Token Bus, Token Ring, FDDI, IEEE standards 802.2, 802.3 Hubs, Bridges, Routers Gateways, Transmission Media: Transmission of signals through Twisted pair, Coaxial cable, optical fibre(SM, MM, Graded Index).

Module 2: II DATA LINK LAYER & MEDIUM ACCESS LAYER - Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Slip, Data link Layer in HDC. Pure and slotted Aloha, CSMA, CSMA/CD, collision free multiple access. Throughput analysis of pure and slotted Aloha, IEEE 802.X Standard Ethernet.

Module 3: NETWORK LAYER - Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing. Dynamic routing – Broadcast routing. Network layer in the Internet: IPv4 & IPv6 Protocols. Congestion Control Algorithms – General Principles – of Congestion prevension policies.

Module 4: DATA TRANSMISSION - Terminology, Frequency, spectrum, bandwidth, analog and digitaltransmission, Transmission impairments, channel capacity including sampling theorem and Fourier series

Wireless Transmission: Antenna and antenna gain, introduction to terrestrial and satellite microwave, Propagation of wireless signals, free space loss for LOS communication.Review of Line Encoding Schemes. Concept of bit period, effect of clock skew, Synchronous and Asynchronous communication

Module 5: MULTIPLEXING - Frequency division, time division (Synchronous and statistical) multiplexing. Multiple Accesses: Performance of FDMA-FM-FDMA, Single channel per carrier. TDMA frame structure TDMA Frame efficiency, TDMA superframe structure, Frame acquisition and synchronization Switching: Qualitative description of Space division, time division and space-time-space division switching.

Text/Reference Books:

1. Computer Network, Leon And Garcia, TMH
2. Data Communication And Networking(Sie), Forouzan, TMH
3. Computer Network, Tanenbaum, Pearson
4. Computer Networking, Kurose, Pearson
5. Computer Networking And Inernet, Halsell, Pearson
6. Digital Telephony, 3rd Ed, James Irvine & David Harle, Wiley

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 602 COMPILER DESIGN

3L+0T+0P+3C **MM:100**

Module 1: OVERVIEW OF COMPILATION - The structure of a compiler and applications of compiler technology; Lexical analysis - The role of a lexical analyzer, specification of tokens, recognition of tokens, hand-written lexical analyzers, LEX, examples of LEX programs.
Introduction to syntax analysis -Role of a parser, use of context-free grammars (CFG) in the specification of the syntax of programming languages, techniques for writing grammars for programming languages (removal left recursion, etc.), non- context-free constructs in programming languages, parse trees and ambiguity, examples of programming language grammars.
Module 2: TOP-DOWN PARSING - FIRST & FOLLOW sets, LL(1) conditions, predictive parsing, recursive descent parsing, error recovery. LR-parsing - Handle pruning, shift-reduce parsing, viable prefixes, valid items, LR (0) automaton, LR-parsing algorithm, SLR(1), LR(1), and LALR(1) parsing. YACC, error recovery with YACC and examples of YACC specifications. Syntax-directed definitions (attribute grammars)-Synthesized and inherited attributes, examples of SDDs, evaluation orders for attributes of an SDD, dependency graphs. S-attributed and L-attributed SDDs and their implementation using LR-parsers and recursive- descent parsers respectively.

Module 3: SEMANTIC ANALYSIS - Symbol tables and their data structures. Representation of "scope". Semantic analysis of expressions, assignment, and control-flow statements, declarations of variables and functions, function calls, etc., using S- and L-attributed SDDs (treatment of arrays and structures included). Semantic error recovery.

Module 4: INTERMEDIATE CODE GENERATION - Different intermediate representations – quadruples, triples, trees, flow graphs, SSA forms, and their uses. Translation of expressions (including array references with subscripts) and assignment statements. Translation of control-flow statements – it-then-else, while-do, and switch. Short-circuit code and control-flow translation of Boolean expressions. Back patching. Examples to illustrate intermediate code generation for all constructs.

Module 5: RUN-TIME ENVIRONMENTS - Stack allocation of space and activation records. Access to non-local data on the stack in the case of procedures with and without nesting of procedures.
Introduction to machine code generation and optimization- Simple machine code generation, examples of machine-independent code optimizations.

Text / Reference Books:

1. Compilers: Principles, Techniques, and Tools , by A.V. Aho, Monica Lam, Ravi Sethi, and J.D. Ullman, (2nd ed.), Addison-Wesley, 2007 (main text book, referred to as ALSU in lab assignments).
2. K.D. Cooper, and Linda Torczon, Engineering a Compiler, Morgan Kaufmann, 2004.
3. K.C. Louden, Compiler Construction: Principles and Practice, Cengage Learning, 1997.
4. D. Brown, J. Levine, and T. Mason, LEX and YACC, O"Reilly Media, 1992.

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 603 DATA MINING & WARE HOUSING

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION - Basic concepts of data mining, including motivation and definition; different types of data repositories; data mining functionalities; concept of interesting patterns; data mining tasks; current trends, major issues and ethics in data mining

Module 2: DATA - Types of data and data quality; Data Preprocessing: data cleaning, data integration and transformation, data reduction, discretization and concept hierarchy generation; Exploring Data: summary statistics, visualization, multidimensional data analysis

Module 3: ASSOCIATION AND CORRELATION ANALYSIS - Basic concepts: frequent patterns, association rules - support and confidence; frequent itemset generation - Apriori algorithm, FP-Growth algorithm; Rule generation, Applications of Association rules; Correlation analysis.

Module 4: CLUSTERING ALGORITHMS AND CLUSTER ANALYSIS - Concept of clustering, measures of similarity, Clustering algorithms: Partitioning methods - k-means and k-medoids, CLARANS, Hierarchical methods - agglomerative and divisive clustering, BIRCH, Density- based methods - Subspace clustering, DBSCAN; Graph-based clustering - MST clustering; Cluster evaluation; Outlier detection and analysis.

Module 5: CLASSIFICATION: BINARY CLASSIFICATION - Basic concepts, Bayes theorem and Naive Bayes classifier, Association based classification, Rule based classifiers, Nearest neighbour classifiers, Decision Trees, Random Forest; Perceptrons; Multi-category classification; Model overfitting, Evaluation of classifier performance - cross validation, ROC curves.

Applications: Text mining, Web data analysis, Recommender systems. Prerequisites: Familiarity with basic Linear Algebra and Probability will be assumed.

Text / Reference Books:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining. Pearson (2005), India. ISBN 978-8131714720
2. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann, 3rd edition (July 2011). 744 pages. ISBN 978-0123814791
3. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann, 3rd edition (January 2011). 664 pages. ISBN 978-0123748560.
4. T. Hastie, R. Tibshirani and J. H. Friedman, The Elements of Statistical Learning, Data Mining, Inference, and
5. Prediction. Springer, 2nd Edition, 2009. 768 pages. ISBN 978- 0387848570
6. C. M. Bishop, Pattern Recognition and Machine Learning. Springer, 1st edition, 2006. 738 pages. ISBN 978- 0387310732

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 604 COMPUTER GRAPHICS AND VISUALIZATION

3L+0T+0P+3C **MM:100**

Module1: INTRODUCTION -History of computer graphics, applications, physical and synthetic images, synthetic camera model, CRT, pixel, frame buffer, resolution, aspect Ratio, flicker, interlacing, raster scan and vector scan displays.

Module2: LINE AND CIRCLE GENERATION –Rasterization, Scan Conversion: point, line, circle, line drawing, Digital Differential Analyzer algorithm, Bresenham's algorithm, comparison of DDA and Bresenham's Algorithm, 8-way symmetry, Mid-Point Circle Algorithm

Module3: GEOMETRIC TRANSFORMATIONS- 2D coordinate system, Homogeneous coordinates affine transformations, 2D transformation, translation, scaling, rotation, reflection, shear, 2D transformation matrix, composite transformation, Inverse transformation

Module 4: CLIPPING AND RENDERING – Point clipping, line clipping, Cohen-Sutherland algorithm, polygon clipping, Sutherland-Hodgman algorithm, polygon representation, polygon filling, flood fill, boundary fill algorithms, rendering, basic illumination model, diffuse reflection, specular reflection, phong shading, Gouraud Shading

Module 5: CURVES AND VISIBILITY – Bezier curves and surfaces, Properties of Bezier Curves, B Spline Curves, Visibility, Hidden Lines and Surfaces, Z Buffer Algorithm

Text / Reference Books:

1. Edward Angel, Interactive Computer Graphics. A Top-Down Approach Using OpenGL (fifth Edition), Pearson Education, 2008
2. Donald Hearn and Pauline Baker, Computer Graphics with OpenGL (third edition), Prentice Hall, 2003
3. F. S. Hill Jr. and S. M. Kelley, Computer Graphics using OpenGL (third edition), Prentice Hall, 2006
4. Peter Shirley and Steve Marschner, Computer Graphics (first edition), A. K. Peters, 2010

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 605 LINUX & SHELL PROGRAMMING

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION: Logging in, changing password (passwd command only), man, xman, info commands to access on line help. Simple commands like ls, cp, mv, grep, head, tail, sort, uniq, diff, echo, date, which, whereis, whatis, who, finger w (option and variations included). Directory commands, access permissions, changing access permissions for files and directories, hard & symbolic links. Environment and path setting

Module 2: VI EDITOR: Creating and editing files, features of vi, insertion deletion, searching, substitution operations, yank, put, delete commands, reading & writing files, exrc file for setting parameters, advance editing techniques. vim(improved vi).

Module 3: INTRODUCTION TO X-WINDOW SYSTEM: x-window as client/ server system, concept of window manager, remote computing & local displays, xinitrc file, customize X work environment and applications, customizing the fvwm window manager.

Module 4: SHELL: Meaning and purpose of shell, Introduction to types of shell. The command line, standard input and standard output, redirection, pipes, filters special characters for searching files and pathnames. Bourne Again SHell: shell script-writing and executing, command separation & grouping, redirection, directory stack manipulation, processes, parameters & variables, keyword variables

Module 5: SHELL PROGRAMMING: Control structures, the Here document, expanding NULL or USET variables, Builtins, functions, history, aliases, job control, filename substitution. source code management- RCS and CVS. awk utility.

Text/References Books :

1. A practical Guide to Linux, Sobell, Pearson.

2. A Practical Guide to Linux Commands, Editors, and Shell Programming, Sobell, Pearson.

3. A Practical Guide to Fedora and Red Hat Enterprise Linux, Sobell, 5e, Pearson

4. Harley Hahn: Guide to Unix & Linux, TMH

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 607 COMPUTER NETWORK LAB

0L+0T+2P+1C **MM:100**

1. The lab is to be conducted in Perl programming language, Perl works on all platforms (including windows)
2. Write few basic programs of Perl.
    a. A Hello World Program
    b. Write a program to add to 10 numbers.
    c. Write a program of reading input from the keyboard and displaying them on monitor.
    d. Write a program to take two strings as input and compare them
3. To understand advance constructs of Perl
    a. Write a program to create a list of your course (all theory courses in current semester) using array and print them.
    b. Write a program to accept ten number, store it into a hash table (Perl have itself) and when asked by user tell him that number exists or not. (do not store duplicate numbers)
    c. Write a program to compute the number of lines in a file.
4. Find the IP address of a host or turn an IP address into a name.
5. Connect to an FTP server and get or put files. Automate the one-time transfer of many files to download the file everyday, which have changed since yesterday. (use Net:FTP)
6. Write a program to send mail. The programs should monitor system resources like disk space and notify admin by mail when disk space becomes dangerously low. (use Net:mail)
7. Fetch mail from a POP3 server (use Net:pop3)
8. Find out who owns a domain (use Net:whois , Whois is a service provided by domain name registration authorities to identify owners of domain names)
9. Test whether a machine is alive. machine can be specified using IP address or domain name of machine.
10. You have a URL that fetch its content from a Perl script, convert it to ASCII text (by stripping html tags) and display it.
11. Writing a TCP Client, Writing a TCP Server and Communicate some data over TCP

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 608 COMPILER DESIGN LAB

0L+0T+2P+1C **MM:100**

Objective: To design and code the front end of the compiler, scanner, parser, intermediate code generator, object code generator, and the parallel compilation strategies through Pascal or C Programming.

1. Develop a lexical analyzer to recognize a few patterns in PASCAL and C.

    a. (ex: identifiers, constants, comments, operators etc.)

2. Write a program to parse using Brute force technique of Top down parsing.

3. Develop on LL (1) parser (Construct parse table also).

4. Develop an operator precedence parser (Construct parse table also)

5. Develop a recursive descent parser.

6. Write a program for generating for various intermediate code forms

    i) Three address code ii) Polish notation

7. Write a program to simulate Heap storage allocation strategy

8. Generate Lexical analyzer using LEX

9. Generate YACC specification for a few syntactic categories.

10. Given any intermediate code form implement code optimization techniques

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 609 DATA MINING AND WAREHOUSING LAB

0L+0T+2P+1C **MM:100**

To understand the data mining techniques through any standard database. All DM processes using any DM tool like WEKA or ide excel API.

1. Gain insight for running pre- defined decision trees and explore results using MS OLAP Analytics.
2. Using IBM OLAP Miner – Understand the use of data mining for evaluating the content of multidimensional cubes.
3. Using Teradata Warehouse Miner – Create mining models that are executed in SQL.

(Portal work: The objective of this lab exercises is to integrate pre-built reports into a portal application)

4. Publish and analyze a business intelligence portal.

Metadata & ETL Lab: The objective of this lab exercises is to implement metadata import agents to pull metadata from leading business intelligence tools and populate a metadata repository. To understand ETL processes

5. Import metadata from specific business intelligence tools and populate a meta data repository.
6. Publish metadata stored in the repository.
7. Load data from heterogeneous sources including text files into a pre-defined warehouse schema.

Case study

8. Design a data mart from scratch to store the credit history of customers of a bank. Use this credit profiling to process future loan applications.
9. Design and build a Data Warehouse using bottom up approach titled 'Citizen Information System'.

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 610 COMPUTER GRAPHICS LAB

0L+0T+2P+1C **MM:100**

1. Implementation of line generation using slope's method, DDA and Bresenham's algorithms.

2. Implementation of circle generation using Mid-point method and Bresenham's algorithm.

3. Implementation of ellipse generation using Mid-point method.

4. Implementation of polygon filling using Flood-fill, Boundary-fill and Scan-line algorithms.

5. Implementation of 2D transformation: Translation, Scaling, Rotation, Mirror Reflection and Shearing (write a menu driven program).

6. Implementation of Line Clipping using Cohen-Sutherland algorithm and Bisection Method.

7. Implementation of Polygon Clipping using Sutherland-Hodgman algorithm.

8. Implementation of 3D geometric transformations: Translation, Scaling and rotation.

9. Implementation of Curve generation using Interpolation methods.

10. Implementation of Curve generation using B-spline and Bezier curves.

11. Implementation of any one of Back face removal algorithms such as Depth-Buffer algorithm, Painter's algorithm, Warnock's algorithm, Scan-line algorithm)

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 611 BACKTRACK LAB

0L+0T+2P+1C **MM:100**

To gain the knowledge of Linux for penetration testing and vulnerability assessment in database, network, operating systems.

1. Introduction to backtrack and kali Linux operating system.
2. Introduction to virtualization, Installation of Backtrack and Kali operating system through VMware and Virtual box tools.
3. Basic commands of Linux to familiar with Backtrack for eg.
4. Information gathering through Kali Linux or Backtrack.
5. Vulnerability analysis through kali Linux or Backtrack.
6. Exploitation tools of Kali Linux and Backtrack.
7. Forensic tools of Kali Linux and Backtrack.
8. Sniffing & Spoofing tools of Kali Linux and Backtrack.
9. Reverse Engineering tools of Kali Linux and Backtrack.
10. Reporting tools of Kali Linux and Backtrack.

Semester VI **B.Tech.(Computer Science & Engineering)**

MGT 204 INTERMEDIATE PROGRAM IN ENTREPRENEURSHIP

0L+0T+2P+1C **MM:100**

Objective: This program will teach the students about market size , costs , channels and customer acquisition , business model and plan finalization , efficiency and growth processes.

Module I : **I**dentify the vertical for operating your business opportunity , understanding your customers and accurately assessing market opportunity , Minimum Viable Product and The Lean Method.

Module II: Developing and validating a business model for your venture – Value Proposition , Customer Segments , Channels and Partners , Revenue Model and Streams , Key Resources , Activities and Costs , Customer Relationships and Customer Development Processes.

Module III: **Tra**nslate your business model into a business plan , Visioning for your venture , Taking your product/service to the market , Delivering an Investor pitch to a panel of investors.

Module IV: Identify possible sources of funding for your venture , Marketing your business – Get to Market Plan , effective ways of marketing for start ups – digital and viral marketing , hire and manage a team , Managing start up finance.

Module V : Legal and regulatory aspects for starting up your venture , Enhancing the growth process and creating scalability , thorough understanding of market size , costs , margins , delivery channels , customer acquisition costs , Key areas of BM Canvas , 1-2 year roadmap and trajectory.

References:

Online courses through MOOC.

1. Tendon ,C: Environment and Entrepreneur; Cliugh Publications, Allahabad.
2. Siner A David: Entrepreneural Megabuks; John Wiley and Sons, New York.
3. Srivastava S. B: A Practical Guide to Industrial Entrepreneurs; Sultan Chand and Sons, New Delhi.
4. Prasanna Chandra: Protect Preparation, Appraisal, Implementation; Tata McGraw Hill. New Delhi.
5. Paudey I.M: Venture Capital - The Indian Experience; Prentice Hall of India. New Delhi
6. Holt: Entrepreneurship-New Venture Creation; Prentice Hall of India. New Delhi
7. World Bank Development report 2015-16.
8. World Bank “doing Business” 2014, 2015, 2016.
9. Govt. of India “Economic survey 2015-16”, Oxford University Press
10. UNDP-Human Development Report 2015-16.

Semester VI **B.Tech.(Computer Science & Engineering)**

BEC 608 INFORMATION THEORY & CODING

3L+0T+0P+3C **MM: 100**

Module 1: ELEMENTS OF INFORMATION THEORY - Measure of information, average information, entropy, and information rate. Communication channel, discrete and continuous channel

Module 2: Shannon-Hartley theorem and its implications. Channel capacity, Gaussian channel and bandwidth-S/N tradeoff.

Module 3: INTRODUCTION OF CODING - types of efforts, types of codes, error control coding, methods of controlling errors

Module 4: LINEAR BLOCK AND BINARY CYCLIC CODES - matrix decryption of linear block codes, error detection and error correction capabilities of linear block codes. Hamming codes, structure of cyclic codes, encoding using an (n-k) bit shift register syndrome calculation, its error detection & correction, special classes of cyclic codes BCH.

Module 5: BURST AND CONVOLUTION CODES - burst and random error correcting codes, encoders for convolution codes. Decoders for convolution codes

Text/Reference Books:

1. Coding and Information Theory (Graduate Texts in Mathematics) by Steven Roman
2. Information and Coding Theory (Springer Undergraduate Mathematics Series) by Gareth A. Jones and J. Mary Jones
3. Information Theory and Network Coding (Information Technology: Transmission, Processing and Storage) by Raymond W. Yeung
4. Fundamentals of Information Theory and Coding Design (Discrete Mathematics and Its Applications) by Roberto Togneri and Christopher J.S deSilva
5. Anoop Singh Poonia, “Information Theory of Coding”, Dhanpat Rai Publishing Company.

Semester VI **B.Tech (Computer Science & Engineering)**

BEC 603 DIGITAL SIGNAL PROCESSING

3L-1T-0P-3.5C **MM: 100**

MODULE 1: REALIZATION OF DIGITAL SYSTEMS - Introduction, direct form realization of IIR systems, cascade realization of an IIR systems, parallel form realization of an IIR systems, Ladder structures: continued fraction expansion of H(z), example of continued fraction, realization of a ladder structure, example of a ladder realization.

MODULE 2: DESIGN OF INFINITE IMPULSE RESPONSE DIGITAL FILTERS - Introduction to Filters, Impulse Invariant Transformation, Bi-Linear Transformation, All- Pole Analog Filters: Butterworth and Chebyshev Design of Digital Butterworth and Chebyshev Filters.

MODULE 3: FINITE IMPULSE RESPONSE FILTER DESIGN - Windowing and the Rectangular Window, Other Commonly Used Windows, Examples of Filter Designs Using Windows, The Kaiser Window.

MODULE 4: DISCRETE FOURIER TRANSFORMS - Definitions, Properties of the DFT, Circular Convolution, Linear Convolution.

MODULE 5: FAST FOURIER TRANSFORM ALGORITHMS - Introduction, Decimation –In Time (DIT) Algorithm, Computational Efficiency, Decimation in Frequency (DIF) Algorithm Applicationof DSPto Speech and Radar signalprocessing.

Text/Reference Books:

1. Digital Signal Processing, Sanjit K Mitra, TMH
2. Digital Signal Processing, S.Salivahanan A Vallavaraj, C.Gnanapriya, TMH
3. Digital Signal Processing: Principals, Algorithms And Applications, John G.Proakis, Dimitris G Manolakis, PHI
4. Digital Signal Processing, A.V. Oppenheim And R.W. Schaffer, PHI
5. Digital Signal Processing, Thomas J. Cavicchi, John Wiley & Sons
6. Digital Signal Processing, Emmanuel Ifeachor, Barry Jervis, Pearson
7. Digital Signal Processing, Chi-Tsong Chen, Oxford
8. Digital Signal Processing, Engelberg, Shlomo, Springer

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 613 ADVANCE DATA STRUCTURES

3L+0T+0P+3C **MM :100**

Module 1: ADVANCED TREES - Definition**s** Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees. Augmenting Red-Black Trees to Dynamic Order Statistics and Interval Tree Applications. Operations on Disjoint sets and its union-find problem Implementing Sets. Dictionaries, Priority Queues and Concatenable Queues using 2-3 Trees.

Module 2: MERGEABLE HEAPS - Merge able Heap Operations, Binomial Trees Implementing Binomial Heaps and its Operations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci Heap Implementing Fibonacci Heap. SORTING NETWORK**:** Comparison network, zero-one principle, bitonic sorting and merging network sorter.

Module 3: GRAPH THEORY DEFINITIONS - Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut-Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs.

Module 4: GRAPH THEORY ALGORITHMS - Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph and Planarity Testing, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and Articulation Point. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms

Module 5: NUMBER THEORITIC ALGORITHM - Number theoretic notation, Division theorem, GCD recursion, Modular arithmetic, Solving Linear equation, Chinese remainder theorem, power of an element, RSA public key Crypto system, primality Testing and Integer Factorization.

Text/Reference Books:

1. Coreman, Rivest, Lisserson, : “Algorithm", PHI.

2. Motwani and Raghavan "Randomized Algorithms", Cambridge University Press

3. Preparata and Shamos "Computational Geometry", Springer Verlag

4. Mehlhorn "Data Structures and Algorithms: 1, Searching and Sorting", Springer Verlag EATCP

5. Monograph on Theoretical Computer Science

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 614 LOGIC SYNTHESES

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION TO VLSI, CIRCUITS ASICS AND MOORE'S LAW - Microelectronic Design, Styles, four phases in creating Microelectronics chips computer Aided Synthesis and Optimization. Algorithms Review of Graph Definitions and Notations Decision and Optimization Problems, Shortest and Longest Path Problems, Vertex Cover, Graph, Coloring, Clique covering and partitioning Algorithms Boolean Algebra and Representation of Boolean Functions, binary Decision diagrams. Satisfiability and cover problems.

Module 2: HARDWARE MODELING - Introduction to Hardware Modeling Language, State Diagrams. Data flow and Sequencing Graphs. Compilation and Behavioral Optimization Techniques. Circuits Specifications for Architectural Synthesis Resources and constraints. Fundamental Architectural Synthesis Problems Temporal Domain Scheduling Spatial Domain Binding Hierarchical Models and Synchronization Problem. Area and performance estimation-Resource Dominated circuits and General Circuits.

Module 3: SCHEDULING ALGORITHMS - Model for Scheduling Problems, Scheduling without Resource, Constraints-Unconstrained Scheduling ASAP Scheduling Algorithms Latency. Constrained Scheduling. ALAP scheduling. Under Timing Constraints and Relative Scheduling with Resource Constraints Integer Linear Programming Model, Multiprocessor Scheduling, Heuristic Scheduling Algorithms (List Scheduling). Force Directed Scheduling.

Module 4: TWO LEVEL COMBINATION LOGIC OPTIMIZATION - Logic Optimization Principles-Definitions, Exact Logic Minimization, Heuristic, Logic Minimization, and Testability Properties Operations on Two level logic Cover-positional Cube Notation, Functions with Multivolume inputs and list oriented manipulation. Algorithms for logic minimization.

Module 5: SEQUENTIAL LOGIC OPTIMIZATION - Introduction, Sequential circuit optimization using state based models- state minimization, state encoding. Sequential circuit optimization using network models. Implicit finite state machine traversal methods. Testability consideration for synchronous circuits.

Text/Reference Books

1. James R.Armstrong, F.Gail Gray, VHDL Design Representation and Synthesis, Pearson education, 2007.
2. Jan M Rabaey, Digital Integrated Circuits - A Desi
Gn Perspective, Prentice Hall, Second Edition, 2005.
3. Wayne Wolf, FPGA-Based System Design, Pearson, 2009.
4. Naveed A. Sherwani, Algorithms for VLSI Physical Design Automation, Springer,Third edition,1999.

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 615 ARTIFICIAL INTELLIGENCE

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION - What is intelligence? Foundations of artificial intelligence (AI). History of AI; Problem Solving- Formulating problems, problem types, states and operators, state space, search strategies.

Module 2: INFORMED SEARCH STRATEGIES - Best first search, A* algorithm, heuristic functions, Iterative deepening A*(IDA), small memory A*(SMA); Game playing - Perfect decision game, imperfect decision game, evaluation function, alpha-beta pruning

Module 3: REASONING - Representation, Inference, Propositional Logic, predicate logic (first order logic), logical reasoning, forward chaining, backward chaining; AI languages and tools - Lisp, Prolog, CLIPS. Planning- Basic representation of plans, partial order planning, planning in the blocks world, heirarchical planning, conditional planning, representation of resource constraints, measures, temporal constraints

Module 4: UNCERTAINTY - Basic probability, Bayes rule, Belief networks, Default reasoning, Fuzzy sets and fuzzy logic; Decision making- Utility theory, utility functions, Decision- theoretic expert systems.

Module 5: INDUCTIVE LEARNING - decision trees, rule based learning, current-best-hypothesis search, least-commitment search , neural networks, reinforcement learning, genetic algorithms; Other learning methods - neural networks, reinforcement learning, genetic algorithms. Communication - Commiunication among agents, natural language processing, formal grammar, parsing, grammar

Text / Reference Books:

1. Stuart Russell and Peter Norvig. Artificial Intelligence – A Modern Approach, Pearson Education Press, 2001.
2. Kevin Knight, Elaine Rich, B. Nair, Artificial Intelligence, McGraw Hill, 2008.
3. George F. Luger, Artificial Intelligence, Pearson Education, 2001.
4. Mils J. Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kauffman, 2002.

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 616 BIG DATA & HADOOP

3L+0T+0P+3C **MM:100**

MODULE 1: INTRODUCTION TO BIG DATA: Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

MODULE 2: INTRODUCTION HADOOP: Big Data – Apache Hadoop & Hadoop Eco System – Moving Data in and out of Hadoop – Understanding inputs and outputs of Map Reduce - Data Serialization.

MODULE 3: HADOOP ARCHITECTURE : Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., Name Node, Secondary Name Node, and DataNode, Hadoop Map Reduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

MODULE 4: HADOOP ECOSYSTEM AND YARN: Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features- Name Node High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

MODULE 5: HIVE AND HIVEQL, HBASE : Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Sub queries, HBase concepts- Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

References & Text Books:

1. Professional Hadoop Solutions, Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, Wiley.
2. Understanding Big data, Chris Eaton, Dirk deroos et al. , McGraw Hill, 2012.
3. HADOOP: The definitive Guide, Tom White, O Reilly 2012.
4. Big Data Analytics with R and Haoop, Vignesh Prajapati, Packet Publishing 2013.
5. Oracle Big Data Handbook, Tom Plunkett, Brian Macdonald et al, Oracle Press, 2014.

Semester VI **B.Tech.(Computer Science & Engineering)**

BCS 617 CLOUD COMPUTING

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION - Shift from distributed computing to cloud computing; principles and characteristics of cloud computing- IaaS, PaaS, SaaS; service oriented computing and cloud environment

Module 2: CLOUD COMPUTING TECHNOLOGY - Client systems, Networks, server systems and security from services perspectives; Accessing the cloud with platforms and applications; cloud storage

Module 3: WORKING WITH CLOUD- INFRASTRUCTURE AS A SERVICE – conceptual model and working Platform as a Service – conceptual model and functionalities Software as a Service – conceptual model and working Technologies and Trends in Service provisioning with clouds

Module 4: USING CLOUD SERVICES - Cloud collaborative applications and services – technology, applications and case studies with calendars, schedulers and event management; cloud applications in project management.

Module 5: CASE STUDIES - Microsoft Azure, Google App Engine and Open source clouds- Open-Nebula and Eucalyptus , Current trends and research

Text / Reference Books:

1. Anthony T.Velte, Toby J.Velte and Robert E, Cloud Computing – A Practical Approach, TMH , 2010
2. Michael Miller, Cloud Computing – Web based Applications, Pearson Publishing, 2011

Semester VI **B.Tech. (Computer Science & Engineering)**

BCS 619: MULTIMEDIA SYSTEM

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION TO MULTIMEDIA: Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment products and Stages of Multimedia Projects, Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing , authoring tools, card and page based authoring tools.

Module 2: MULTIMEDIA BUILDING BLOCKS: Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.

Module 3: DATA COMPRESSION: Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modeling. Finite Context Modeling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW Compression, compression, Compression Ratio loss less & lossy compression.

Module 4: SPEECH COMPRESSION & SYNTHESIS: Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression.

Module 5: IMAGES: Multimedia monitors, bitmaps, Vector drawing, lossy graphic compression, image file formats, animations, Images standards, JPEG Compression, Zig Zag Coding, Multimedia Database. Content based retrieval for text and images, Video: Video representation, Colors, Video Compression, MPEG standards Video Streaming on net, Video Conferencing, Multimedia Broadcast services, Indexing and retrieval of Video Database, recent development in Multimedia.

Text/Reference Books:

1. Tay Vaughan "Multimedia, Making IT Work" Osborne TMH.
2. Buford "Multimedia Systems" Addison Wesley.
3. Aagrawal & Tiwari "Multimeida Systems" Excel.
4. Sleinreitz "Multimedia System" Addison Wesley.

Semester VII **B.Tech.(Computer Science & Engineering)**

BCS 701 INFORMATION SYSTEM SECURITY

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION: introduction to security attacks, services and mechanism, introduction to cryptography -Conventional Encryption: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers.

Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

Module 2: CRYPTOGRAPHY ALGORITHM: Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, primality testing, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffle-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, Elganel encryption.

Module 3: MESSAGE AUTHENTICATION AND HASH FUNCTION - Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm.

Module 4: AUTHENTICATION APPLICATIONS - Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME.

Module 5: IP SECURITY - Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management.

Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET).

System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.

Text/Reference Books:

1. Computer Security, Dicter gouman, John Wiley & Sons
2. Computer Security: Art and Science, Mathew Bishop, Addison-Wisley
3. Introduction to computer Security- Mathew Bishop, Addison-Wisley
4. Network security, Kaufman, Perlman and Speciner, Pearson Education
5. Cryptography and Network Security, william Stallings, Pearson Education
6. William Stallings, "Cryptography and Network Security: Principals and Practice", Prentice Hall, New Jersy.
7. Johannes A. Buchmann, "Introduction to Cryptography", Springer-Verlag.

Semester VII **B.Tech.(Computer Science & Engineering)**

BCS 702 IMAGE PROCESSING

3L+0T+0P+3C **MM: 100**

Module 1: INTRODUCTION – Fundamental steps in DIP, elements of DIP, Simple image model, sampling & quantization, basic relationships between pixels, colour image model.

Module 2: IMAGE TRANSFORMS – One-dimensional & two-dimensional DFT, cosine, sine, Hadamard, Haar, and Slant & KL transforms. Image Enhancement: Introduction, point operations, histogram modelling, spatial operations, Transform operations.

Module 3: IMAGE RESTORATION – Introduction, image observation models, Inverse & Wiener filtering, difference between enhancement & restoration Restoration-spatial filtering, Noise reduction in frequency domain.

Module 4: IMAGE COMPRESSION – Introduction, Pixel coding, Predictive coding, Transform coding, Inter-frame coding

Module 5: IMAGE SEGMENTATION – Introduction, Spatial feature extraction, Transforms features, Edge detection, Boundary extraction, Segmentation techniques.

Text/Reference Books:

1. Digital Image Processing Using MATLAB, Gonzalez, Woods and Eddins, Gatesmark Publishing
2. Applications of Pattern Recognition, Fu, K.S., CRC Press
3. Digital Image Restoration, Andrews, H.C. Hunt, B.R., Prentice Hall, Englewood Cliffs.
4. Applications of Digital Signal Processing, Oppenheim, A.V.,Prentice Hall Englewood Cliffs.
5. Digital Image Processing, Gonzalez, R.C. & Wintz, P.A., Reading, Addison-Wesley.

Semester VII **B.Tech.(Computer Science & Engineering)**

BCS 704 PROGRAMMING USING MATLAB

0L+0T+2P+1C **MM: 100**

LIST OF EXPERIMENTS

1. Practicing MATLAB environment with simple exercises to familiarize Command Window, History, Workspace, Current Directory, Figure window, Edit window, Shortcuts, Help files.
2. Data types, Constants and Variables, Character constants, Operators, Assignment statements.
3. Control Structures: For loops, While, If control structures, Switch, Break, Continue statements.
4. Input-Output functions, Reading and Storing Data.
5. Vectors and Matrices, commands to operate on vectors and matrices, Matrix Manipulations.
6. Arithmetic operations on Matrices, Relational operations on Matrices, Logical operations on Matrices.
7. Polynomial Evaluation, Roots of Polynomial, Arithmetic operations on Polynomials.
8. Graphics: 2D plots, Printing labels, Grid & Axes box, Text in plot, Bar and Pie chart.

Semester VII **B.Tech. (Computer Science & Engineering)**

BCS 720: SKILL DEVELOPMENT LAB – II
(.NET FRAMEWORK)

0L+0T+2P+1C **MM:100**

Module 1: Introduction to the .NET Platform Common Language Runtime (CLR). The Common Type Specification (CTS). The Common Language Specification (CLS). Assemblies- .NET Base Classes CLR Debugger.

Module 2: Introduction to C# - Data type Operators Flow Control and Iteration Arrays and Strings Basics of C# Classes Boxing and Unboxing Reflection Interoperability, The Preprocessors Attributes Name Spaces.

Module 3: Object-Oriented Programming in C# - Encapsulation, Inheritance and Polymorphism, Exception Handling, Garbage Collection Input and Output (Directories, Files and Streams).

Module 4: Implementing the ICloneable and IComparable Interfaces, Introduction to .NET Collections (including Custom Collections) Custom Indexers, Delegates and Events Multithreading and Synchronization Type Reflection and Attributes Programming the Windows Registry.

Module 5: GDI+ Graphics Tutorial (including Fonts, Brushes, Images, and using .NET Resources) COM, COM+, and .NET Interoperability ADO.NET for Database Programming with Datasets and Object Model. Windows Applications: Winforms, Winforms Namespace Creating Winforms Applications in VS.NET Developing Windows Applications.

Reference Books:

1. Robert J.Oberg, Introduction to C# using .NET, PHI,2002
2. Andrew Troelsen, C# and .NET Platform, Apress, 1st edition 2001.
3. Ben Albahari, Peter Drayton and Brad Merrill, C# Essentials, SPD 2001.
4. Microsoft C# Language Specifications, WP Publishers and Distributors Pvt. Ltd., 2001.

Semester VII **B.Tech. (Computer Science & engineering)**

BCS 705 CYBER SECURITY LAB

0L+0T+2P+1C **MM- 100**

1. **Introduction to Cyber Security**: Cybercrimes in Society, Types of cybercrimes, Ethical hacking, Facts and other issues.
2. **Information Gathering:** Information gathering of people, websites, networks through tools and internet.
3. **Network related terms:** Network terminologies, IP addresses, Mac Address, important commands like PING, NSLOOKUP, IPCONFIG, Reverse IP and others.
4. **Fake E-mails, Viruses & Trojans, Phishing Attack:** Detect and locate fake mails, classes of viruses, Trojan creators, live Trojan attacks, implementation of virtual machines, Live phishing attacks on Gmail, Facebook (with prevention)
5. **Google Efficient Search:** SEO based search, Keyword based search, Introduction to Google Power Search Certification, Live examples of power searching, how search engines are beneficial to Security professionals & hackers
6. **Basic SQL Injections:** Introduction to SQL queries, Loopholes in SQL structure, Admin based SQL Injections, PERL Tools for Finding Admin Engines
7. Advance **SQL Injections:** Advance SQL Injections, URL based, Blind SQL injections, Tools for finding SQL injection based Errors (Black Box Testing)
8. **Proxy Servers & VPN:** Web based proxies, VPN, Role of VPN, Tools like Ultrasurf, TOR, Hotspot shield, Anchor free, Zend2, ZAP VPN
9. **System Hacking:** Structures of Operating System, Loopholes in Windows operating system families, Live mode Linux drives, Live attack on Operating systems
10. **Data Wrapping Techniques:** Secure your data, Concept of Steganography, Concepts of Cryptography, Tools to encrypt the data and HTTPS
11. **Course Certification Test:** Analysis of Students Performance through a Live Situational Test

Semester VII **B.Tech.(Computer Science & Engineering)**

BCS 706 PROJECT LAB

0L+0T+2P+1C **MM: 100**

The objective of Project Work is to enable the student to take up investigative study in the broad field of Computer Science & Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiattion for the student(s) in R&D work. The assignment to normally include:

- Survey and study of published literature on the assigned topic;
- Working out a preeliminary Approach to the Problem relating to the assigned topic; Conducting preliminary Analysis/Modelling/Simulation/Experiment/Design/ Feasibility;
- Preparing a Written Report on the Study conducted for presentation to the Department;
- Final Seminar, as oral Presentation before a Departtmental Committtee.

Semester VII **B.Tech.(Computer Science & Engineering)**

MGT 103 PROJECT FORMULATION AND APPRAISAL

0L+0T+2P+1C **MM:100**

Module 1 **INTRODUCTION –** project attributes; project life cycle; role of managers; Management – scheduling; Gantt charts; CPM; PERT; crashing; Generation of project ideas – resource allocation; environment analysis – PEST analysis, porter's model; analysis of strategic capabilities – value chain, BCG matrix, flexibility

Module 2 **APPRAISAL METHODS IN PROJECT SCANNING AND SELECTION –** market appraisal; technical appraisal; environmental appraisal; evaluating intangibles, social appraisal – SCBA, UNIDO, LM, CSR

Module 3 Total quality management

Module 4 **FINANCIAL APPRAISAL:** Time value of money; cost of capital – equity, debt, preference; weighted average cost; marginal and average cost; Capital budgeting – investment appraisal techniques; NPY; IRR; Payback period; replacement decisions; selection of exact discount factor – problems, inflation, taxation;

Module 5: **RISK ANALYSIS MODELS –** single probability analysis; sensitivity analysis; break even analysis; certainty equivalent; uncertainty analysis, simulation; decision tree model; risk and utility.

References & Text Books

1. Khatua Sitangshu. *Project Management and Appraisal*, Oxford University Press
2. Pandey, I.M. *Financial Management*. Vikas Publishing House
3. Prasanna, Chandra. *Financial Management*. Tata McGraw-Hill
4. Maheshwari, S .N. & Maheshwari, S. K. *Advanced Management Accounting Vol.1 & Vol.2*. Vikas Publishing House
5. Paresh Shah. *Management Accounting*. Oxford University Press

Semester VII **B.Tech.(Computer Science & Engineering)**

BCS 707 SEMINAR

0L+0T+2P+1C **MM:100**

OBJECTIVE

The students are to select one technical topic related its branch for Seminar. The student is to submit the synopsis for assessment and approval. Progress for preparation of the seminar topic would be continuously assessed from time to time. Two periods per week are to be allotted and students are expected to present the seminar Progress. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain the attendance.

Students have to give a final presentation for 15 minutes on his topic. Students are encouraged to use various teaching aids such as overhead projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews

Semester VII **B.Tech. (Computer Science & Engineering)**

BCS 719: CAMPUS RECRUITMENT TRAINING – II

0L+0T+2P+1C **MM:100**

Module 1: QUANTATIVE APTTITIDE: Numbers Theory, Averages, Ratio, Proportion & Variation, Percentages, Mixtures & Allegation, Time and Work, Speed, Time and Distance, Pipes & Cisterns, Clocks and Calendars, Profit and Loss, Interest and Discount, Partnership, Progressions, Logarithm, Quadratic Equations, Inequalities, Functions, Basic Geometry, Menstruation, Co-ordinate Geometry, Permutation and Combination, Probability.

Module 2: VERBAL ABILITY AND READING COMPREHENSION: Fill in the blanks, Synonyms and Antonyms, Analogies.

Module 3: DATA INTERPRETATION & DATA SUFFICEINCY: Tables, Graphs, Pie-Charts, Bar Charts, Mixed Charts, Data Sufficiency Statements.

Module 4: ANALYTICAL AND LOGICAL REASONING: Puzzle Test, Coding-Decoding, Blood Relations, Day Sequence, Directional Sense Test, Symbol based problems, Syllogism, Cubes and Dices.

Module 5: GENERAL KNOWLEDGE

Text/Reference Books:

1. R.S. Aggarwal, A Modern Approach to Verbal and Non-Verbal Reasoning, S. Chand Publication
2. Wren & Martin, High School English Grammar, S.Chand Publication
3. Nem Singh, Reasoning & Aptitude 2015, Made Easy Publication.

Semester VII **B.Tech. (Computer Science & Engineering)**

BCS 709 ADVANCE COMPUTER ARCHITECTURES

3L+0T+0P+3C **MM: 100**

Module 1: INTRODUCTION - Parallel Computing, Parallel Computer Model, Program and Network Properties, Parallel Architectural Classification Schemes, Flynn's & Feng's Classification, Performance Metrics and Measures, Speedup Performance Laws: Multiprocessor System and Interconnection Networks; IEEE POSIX Threads: Creating and Exiting Threads, Simultaneous Execution of Threads, Thread Synchronization using Semaphore and Mutex, Canceling the Threads.

Module 2: PIPELINING AND MEMORY HIERARCHY - Basic and Intermediate Concepts, Instruction Set Principle; ILP: Basics, Exploiting ILP, Limits on ILP; Linear and Nonlinear Pipeline Processors; Super Scalar and Super Pipeline Design; Memory Hierarchy Design: Advanced Optimization of Cache Performance, Memory Technology and Optimization, Cache Coherence and Synchronization Mechanisms.

Module 3: THREAD AND PROCESS LEVEL PARALLEL ARCHITECTURE - Introduction to MIMD Architecture, Multithreaded Architectures, Distributed Memory MIMD Architectures, Shared Memory MIMD Architecture, Clustering, Instruction Level Data Parallel Architecture, SIMD Architecture, Fine Grained and Coarse Grained SIMD Architecture, Associative and Neural Architecture, Data Parallel Pipelined and Systolic Architectures, Vector Architectures.

Module 4: Parallel Algorithms: PRAM Algorithms - Parallel Reduction, Prefix Sums, Preorder Tree Traversal, Merging two Sorted lists; Matrix Multiplication: Row Column Oriented Algorithms, Block Oriented Algorithms; Parallel Quicksort, Hyper Quick sort; Solving Linear Systems: Gaussian Elimination, Jacobi Algorithm; Parallel Algorithm Design Strategies.

Module 5: Developing Parallel Computing Applications - OpenMP Implementation in 'C': Execution Model, Memory Model; Directives: Conditional Compilation, Internal Control Variables, Parallel Construct, Work Sharing Constructs, Combined Parallel Work-Sharing Constructs, Master and Synchronization Constructs; Run-Time Library Routines: Execution Environment Routines, Lock Routines, Timing Routines; Simple Examples in 'C'. Basics of MPI.

Text/Reference Books:

1. **Kai Hwang**," Advance Computer Architecture", **TMH**
2. **Hennessy and Patterson**," Computer Architecture: A Quantitative Approach", **Elsevier**
3. **M.J. Flynn,** "Computer Architecture: Pipelined and Parallel Processor Design", Narosa Publishing House/Jones

Semester VII **B.Tech.(Computer Science & Engineering)**

BCS 710 DISTRIBUTED SYSTEMS

3L+0T+0P+3C **MM:100**

Module 1: DISTRIBUTED DEADLOCK DETECTION - system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms. Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

Module 2: DEADLOCK DETECTION - system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms. Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

Module 3: DISTRIBUTED OBJECTS AND REMOTE INVOCATION - Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.
SECURITY: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent.
DISTRIBUTED FILE SYSTEMS: File service architecture, Sun Network File System, The Andrew File System, Recent advances.

Module 4: TRANSACTIONS AND CONCURRENCY CONTROL - Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control. DISTRIBUTED TRANSACTIONS: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Module 5: DISTRIBUTED ALGORITHMS - Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm.CORBA CASE STUDY: CORBA RMI, CORBA services.

Text/Reference Books:

1. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.

2. Gerald Tel, "Distributed Algorithms", Cambridge University Press

3. William Stalling, Distributed System, Addision Wesley

Semester VII **B.Tech (Computer Science & Engineering)**

BEC 710 DIGITAL SYSTEM DESIGN USING VHDL

3L-0T-0P-3C **MM: 100**

MODULE 1: INTRODUCTION: Digital system design Methodology, Advantages, Requirement Analysis and specification, HDL V/S programming languages, Emergence of HDL, Fundamental & history of various hardware description language, VHDL description, Verification Using simulations, Functional Simulation, Logic Synthesis, Place and route and timing Simulation VHDL for Synthesis V/s Simulation, Design flow of ASICs and standard logic circuits.

MODULE 2: LANGUAGE FUNDAMENTALS: Basic constructs of VHDL programs-Entity declaration, architecture declaration, configuration declarations, package body, package declarations,Entities, Architectures and coding Styles, Comparison of different VHDL coding styles, Identifiers, Signals and Data types, Operators, Overloading, Types of delays, Dataflow, Structural, Behavioral and RTL Style of Combinational design,Signals verses Variables

MODULE 3: VHDL STATEMENTS:- Process statements, Block Statements,Assignments statements, Component declarations, Component instantiation ststements, generate statements, IF statements, case statements, Loop ststements, next statements, Exit statements, return statements, Null statements, wait statements, Assertion statements, concurrent v/s sequential statements, Library& Packages, subprogram-Function and procedure, test benches, generics.

MODULE 4: COMBINATIONAL and SEQUENCIAL CIRCUITS BUILDING BLOCKS:

VHDL modeling of combinational circuits-Half adder, full adder, half subtractor, full subtractor, Multiplexer, demultiplexer, encoder, decoder, Code Converters, comparators, implementation of Boolean equations using VHDL, VHDL modeling for sequential circuits-Flip-Flops, shift registers, Counters,VHDLmodeling for synchronous and asynchronous sequential circuits.

MODULE 5: DIGITAL SYSTEM DESIGN: Building Block circuits, Memory organization, SRAM, Design examples of Multiplier, Shifting & Sorting Operations, Clock Synchronization, CPU organization and design concepts.

Text/Reference Books:

1. Z. Navabi, “VHDL-Modular Design and Synthesis of cores and Systems”, TMH – 3rd Edition.
2. R.D.M. Hunter, T. T. Johnson, “Introduction to VHDL” Spriger Publication, 2010.
3. C. H. Roth, “Digital System Design using VHDL”, PWS Publishing
4. Douglas Perry, “VHDL- Programming by examples”, MGH

Semester VIII **B.Tech.(Computer Science & Engineering)**

BCS 711 ADVANCE JAVA

3L+0T+0P+3C **MM:100**

Module –I :APPLET: Applet & Application Applet Architecture. Parameters to Applet Embedding Applets in Web page. Applet Security Policies

Module-I: A COLLECTION OF USEFUL CLASSES Utility Methods for Arrays Observable and Observer Objects Date & Times Using Scanner Regular Expression Input/Output Operation in Java(java.io Package) Streams and the new I/O Capabilities Understanding Streams The Classes for Input and Output The Standard Streams Working with File Object File I/O Basics Reading and Writing to Files Buffer and Buffer Management Read/Write Operations with File Channel Serializing Objects

Module-III: GUI PROGRAMMING Designing Graphical User Interfaces in Java Components and Containers Basics of Components Using Containers Layout Managers AWT Componets Adding a Menu to Window Extending GUI Features Using Swing Components Java Utilities (java.util Package) The Collection Framework : Collections of Objects Collection Types Sets Sequence Map Understanding Hashing Use of ArrayList & Vector

Module-IV :EVENT HANDLING-IV Event-Driven Programming in Java Event- Handling Process Event-Handling Mechanism The Delegation Model of Event Handling Event Classes Event Sources Event Listeners Adapter Classes as Helper Classes in Event Handling Anonymous Inner classes a Short –cut to Event Handling Avoiding Deadlocks in GUI Code Event Types & Classes Networking Programming Networking Basics Client-Server Architecture Socket Overview Networking Classes and Interfaces Network Protocols Developing Networking Applications in Java

Module –V: DATABASE PROGRAMMING USING JDBC Introduction to JDBC JDBC Drivers & Architecture CURD operation Using JDBC Connecting to non- conventional Databases. Developing and Deploying Servlets Exploring Deployment Descriptor (web.xml). Handling Request and Response

Text Books & References:

1. Complete reference Java by Herbert Scheldt, McGraw Hill
2. Programming in java: Black Book, Dreamtech press, 2013 edition
3. Inside Java by Karanjit S. Siyan , James L. Weaver

Semester VIII **B.Tech.(Computer Science & Engineering)**

BCS 712 HIGH SPEED NETWORKS

3L+0T+0P+3C **MM:100**

Module I HIGH SPEED NETWORKS Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements – Architecture of 802.11

Module II CONGESTION AND TRAFFIC MANAGEMENT Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

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Module III TCP AND ATM CONGESTION CONTROL TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

Module IV INTEGRATED AND DIFFERENTIATED SERVICES Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services

Module V PROTOCOLS FOR QOS SUPPORT RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

Text Books & References:

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.
2. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
3. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003

Semester VII **B.Tech.(Computer Science & Engineering)**

BCS 713 ADVANCE OBJECT ORIENTED PROGRAMMING WITH C++

3L+0T+0P+3C **MM:100**

Module I: Object oriented programming concepts, objects, classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism.

Introduction to C++, classes, access specifiers, function and data members, default arguments, function overloading, friend functions, const and volatile functions – static members, Objects, pointers and objects, constant objects, nested classes, local classes.

Module II: Constructors, default constructor, Parameterized constructors, Constructor with dynamic allocation, copy constructor, destructors, operator overloading, overloading through friend functions, overloading the assignment operator, type conversion, explicit constructor.

Module III: Function and class templates- Exception handling, try-catch-throw paradigm, exception specification, terminate and Unexpected functions, Uncaught exception.

Module IV: Inheritance, public, private, and protected derivations, multiple inheritance – virtual base class, abstract class, composite objects Runtime polymorphism, virtual functions, pure virtual functions, RTTI, typeid, dynamic casting, RTTI and templates, cross casting, down casting .

Module V: Streams and formatted I/O, I/O manipulators - file handling, random access, object serialization, namespaces - std namespace, ANSI String Objects, standard template library.

Text/Reference Books:

1. Dietel and Associates, “C++ How to Program”, 7th Ed., Prentice-Hall
2. Object Oriented Programming using C++, Robert Lafore, Pearson
3. Waite Groups C++ Primer Plus, Stephen Prata, Techmedia.
4. C++ Primer, Lippman & Lajoie, Pearson.
5. The C++ Programming Language, B.J. Stroustrup,Pearson.
6. C++ Complete Reference, Shield, MGH

Semester VII **B.Tech.(Computer Science & Engineering)**

BEC 703 WIRELESS COMMUNICATION

3L+0T+0P+3C **MM: 100**

Module 1: INTRODUCTION – Wireless communication standard(1G,2G,2.5G,3G,4G), Fundamentals of fading, Multipath channels, Free space loss, Fresnel zone clearance bending of radio beam, Effective earth radius, Building blocks of Transmitter & Receiver.

Module 2: MULTIPLE ACCESS TECHNIQUES – FDMA, TDMA and CDMA with reference to mobile radio and satellite systems. TDMA based networks. CDMA based networks

Module 3: MOBILE COMMUNICATION CONCEPT – Cell fundamental, frequency reuse concept, Concept of cluster, Co channel and adjacent channel concept, cell splitting, sectoring, microcell zone concept, Fixed channel assignment, Dynamic channel assignment.

Module 4: CELLULAR WIRELESS NETWORKS-GSM – Introduction, overview of the GSM systems, GSM codec, channel coding and interleaving, radio like control, CDMA Digital cellular standard- CDMA forward channel, Reverse CDMA Channel.

Module 5: INTRODUCTION TO NETWORK IN WIRELESS MOBILE COMMUNICATION - Traffic routing-Circuit switching, packet switching, cordless system and WLL, Mobile IP, Wireless access protocol, . Wireless LAN's: Technology.
IEEE 802.11 standards and Blue tooth. Broadband Wireless 802.16 ,Wireless data service-ISDN,CDPD

Text/Reference Books:

1. Mobile Cellular Telecommunications, W.C.Y. Lee, TMH
2. Wireless Communication And Networking, Misra, TMH
3. Fundamentals Of Satellite Communications, K.N. Raja Rao, PHI
4. Wireless Broadband Networks, David T. Wong, Peng-Yong Kong, John Wiley & Sons
5. Satellite Communications, Timothy Pratt, Charles Bostian And, John Wiley & Sons
6. Wireless Communications, Theodore S. Rappaport, Pearson
7. Wireless Communication And Networking, William Stallings, Pearson
8. Wireless Communication, Upena Dalal, Oxford

Semester VII **B.Tech.(Computer Science & Engineering)**

BCS 714 REAL TIME SYSTEMS

3L+0T+0P+3C **MM:100**

Module 1: INTRODUCTION - Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

Module 2: REAL TIME SCHEDULING - Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

Module 3: RESOURCES ACCESS CONTROL - Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

Module 4: MULTIPROCESSOR SYSTEM ENVIRONMENT - Multiprocessor and Distributed System Model, Multiprocessor Priority-Ceiling Protocol, Schedulability of Fixed-Priority End-to-End Periodic Tasks, Scheduling Algorithms for End-to-End Periodic Tasks, End-to-End Tasks in Heterogeneous Systems, Predictability and Validation of Dynamic Multiprocessor Systems, Scheduling of Tasks with Temporal Distance Constraints.

Module 5: REAL TIME COMMUNICATION - Model of Real Time Communication, Priority-Based Service and Weighted Round- Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols, Real Time Protocols, Communication in Multicomputer System, An Overview of Real Time Operating Systems.

Text/Reference Books:

1. Real Time Systems by Jane W. S. Liu, Pearson Education Publication.
2. Real-Time Systems: Scheduling, Analysis, and Verification by Prof. Albert M. K.Cheng, John Wiley and Sons Publications.
3. Real Time System, Poonam Singh, Dhanpat Rai

Semester VII **B.Tech.(Computer Science & Engineering)**

BCS 715 PARALLEL COMPUTING

3L+0T+0P+3C **MM:100**

Module 1: MOTIVATION - Modern parallel computers, seeking concurrency, data clustering, programming parallel computers

Parallel Architectures: Interconnection networks, Processor arrays, multiprocessors, multicomputers, Flynn's taxonomy

Module 2: PARALLEL ALGORITHM DESIGN - Foster's design methodology, boundary value problem, finding the maximum, the n-body problem, adding data input

Module 3: MESSAGE PASSING PROGRAMMING - The message passing model, interface, circuit satisfiability Floyd's Algorithm: All pairs shortest path problem, creating arrays at run time, designing the parallel algorithm, point to point communication

Module 4: MATRIX-VECTOR MULTIPLICATION - Row-wise and column-wise block-striped decomposition, checkerboard block decomposition Sorting: quicksort

Module 5: SHARED MEMORY PROGRAMMING - The shared memory model, Parallel for loops, data and function parallelism

Text/Reference Books:

1. Parallel Programming in C with MPI and OpenMP by M.J. Quinn
2. Introduction to Parallel Computing (2^{nd} Edition) by Ananth Grama, George Karypis, Vipin Kumar, Anshul Gupta

Semester VII **B.Tech. (Computer Science & Engineering)**

BCS 716: SOFTWARE PROJECT MANAGEMENT

3L+0T+0P+3C **MM:100**

Module 1: PROJECT MANAGEMENT: The management spectrum , the product, the process, the project, the W5HH principle, Critical Practices Metrics and Process and Project: Metrics in the process and project Domains, software measurements, metrics for software quality, integrating metrics within software process, metrics for small organizations, establishing a software metrics program.

Module 2: ESTIMATION: Observations, Project Planning Process, Software Scope and Feasibility, Resources, Software Project Estimation, Decomposition techniques, empirical estimation models, and estimation for object oriented projects, estimation for Agile Development and Web Engineering Projects, The make/buy Decision.

Module 3: PROJECT SCHEDULING: Basic Concepts, Project Scheduling, Defining a task set and task network, Scheduling, Earned value analysis.
RISK MANAGEMENT: Reactive V/S Proactive Risk Strategies, Software Risks, Risk identification, Risk projection, Risk refinement, Risk mitigation, monitoring and management, The RMMM plan.
QUALITY PLANNING: Quality Concepts, Procedural Approach to Quality Management, Quantitative Approaches to Quality Management, Quantitative Quality Management Planning, Setting the Quality Goal, Estimating Defects for Other Stages, Quality Process Planning, Defect Prevention Planning.

Module 4: QUALITY MANAGEMENT: Quality Concepts, Software Quality Assurances, Software Review, Formal Technical Reviews, Formal Approaches to SQA, Statistical Software Quality Assurances, Change Management: Software Configuration Management, The SCM Repository, SCM Process, Configuration Management for Web Engineering.

Module 5: PROJECT EXECUTION AND CLOSURE: The Review Process, Planning, Overview and Preparation, Group Review Meeting, Rework and follow-up, One- Person Review, Guidelines for Review in Projects, Data Collection, Analysis and Control Guidelines, Introduction of Reviews and the NAH Syndrome.
PROJECT MONITORING AND CONTROL: Project Tracking, Activity Tracking, Defect Tracking, Issues Tracking, Status Reports, Milestone Analysis, Actual Versus Estimated Analysis of Effort and Schedule, Monitoring Quality, risk –Related Monitoring.
PROJECT CLOSURE: Project closure Analysis, The Role of closure Analysis, Performing Closure Analysis.

Text/Reference Books:

1. R.S. Pressman, Software Engineering, TMH, 7th Edition.
2. Pankaj Jalote, Software Project Management in Practice, Addison-Wesley.
3. B.Hughes & M. Cotterell, Software Project Management, TMH.

Semester VIII **B.Tech. (Computer Science & Engineering)**

BCS 801: PRACTICAL TRAINING IN INDUSTRY (ONE SEMESTER)

0L+0T+0P+16C **MM:100**

To improve the professional competency and research aptitude by touching the areas which otherwise not covered by theory or laboratory classes. The practical training aims to develop the work practice in students to apply theoretical and practical tools/techniques to solve real life problems related to industry and current research.

The purpose of practical training is not only to get acquainted with the culture of companies, but also to realize something of importance for the company visited. By working in a group within the company, it is expected that the trainee gets a better insight in the practical aspects of the industry. This is intended to facilitate the transition from the thorough theoretical education, dispensed at our University, into an industrial professional career.