S.E. Sem. III [CMPN]

Computer Organization and Architecture

SYLLABUS

Time : 3 Hrs. **Theory :** 100 Marks

Term Work : 25 Marks

1. **Basic structure of computer**
   Introduction of computer system and its sub modules, Basic organization of computer and block level description of the functional units. Von newmann model, Introduction to buses and connecting I/O devices to CPU and memory, Asynchronous and synchronous bus, PCI, SCSI.

2. **Arithmetic and Logic Unit.**
   Arithmetic and logical unit hardware implementation, Booth's Recoding, Booth's algorithm for signed multiplication, Restoring division and non restoring division algorithm, IEEE floating point number representation and operations.

3. **Central processing unit.**
   CPU architecture, Register organization, Instruction formats and addressing modes (Intel processor)., Basic instruction cycle, Instruction interpretation and sequencing, Control Unit operation, Hardwired control unit design methods and design examples, Multiplier control unit, Micro programmed control unit, basic concepts, Microinstruction sequencing and execution, Micro operations, concepts of nanoprogramming, Introduction to RISC and CISC architectures, design issues and examples of RISC processors.

4. **Memory Organization.**
   Characteristics of memory system and hierarchy, concepts of semiconductor memories, main memory, ROM, EPROM, RAM, SRAM, DRAM, SDRAM, RDRAM, Flash memory, Stack Organization. High speed memories: Cache memory organization and mapping, replacement algorithms, cache coherence, Interleaved and associative memories, Virtual memory, main memory allocation, segmentation paging. Secondary storage. RAID optical memory, CDROM, DVD.

5. **I/O Organization.**
   Input/Output systems. Programmed I/O, Interrupt driven I/O, I/O channels, DMA, Peripheral Devices. U.S.B.

6. **Multiprocessor Configurations.**
   Flynn's classifications, parallel processing concepts. Introduction to pipeline processing and pipeline hazards, design issues of pipeline architecture. Instruction pipeline. Instruction level parallelism and advanced issues.

7. **SPARC**
   Static and Dynamic data flow design, Fault tolerant computers, Interprocessor communication and synchronization, cache coherence, shared memory multiprocessor.

8. **Systolic Architectures**
   Systolic arrays and their applications, wave front arrays.

S.E. Sem. III [CMPN]

Digital Logic Design and Application

SYLLABUS

Time : 3 Hrs. **Theory :** 100 Marks

Term Work : 25 Marks

1. **Number systems :** Decimal, Binary, Octal and Hexadecimal number system and conversion. Number system's application e.g. shaft encoding, Binary weighted codes, Signed number binary order, 1's and 2's complement codes, All number system's arithmetic.
   Boolean Algebra : Binary logic functions, Boolean laws, Truth tables, Associative and distributive properties, Demorgan's Theorem, Realization of switching functions using logic gates.

2. **Combinational logic :** Switching equations, Canonical logic forms, Sum of product and Product of sum, karnaugh maps, two, three and four variable karnaugh graph. Simplification of expression Quine-mccluskey minimization techniques, Mixed logic combinational circuits, Multiple output functions.

3. **Analysis and design of combinational logic :** Introduction of combinational circuits, Multiplexer and demultiplexer, Multiplexers as function generator, Binary adder, Substractor, BCD adder, Binary comparator with physical applications. Arithmetic and logic units, Design of combinational circuits using statements.

4. **Sequential Logic :** Sequential circuits, Flip flop conversions, clocked and edge triggered flip flops timing specifications, Timing analysis, state diagrams and tables, transition tables, Excitation table and equations, Examples using flip flops.

5. **Sequential Circuits :** Simple synchronous and asynchronous sequential circuit analysis, Different types of counters asynchronous and synchronous, Counter Design with state equations, Registers, Different types of shift registers, Construction of stage diagram and counter design.

6. **Digital integrated circuits :** Digital circuit logic levels. Propagation delay times. Power dissipation. Fan out and fan in. Noise margin for popular logic families. TTL, TTL sub families. CMOS and their performance comparison (Numericals expected).

❑ ❑ ❑ ❑ ❑ ❑

S.E. Sem. III [CMPN]

Data Structure and Files

SYLLABUS

Time : 3 Hrs. **Theory :** 100 Marks

Practical & Oral : 25 Marks **Term Work :** 25 Marks

1. **Introduction to Data Structures :**
   Definition; The Abstract Data Type(ADT); Arrays; Strings; Recursion.

2. **File Handling :**
   File Organization; Types of files; File operations.

3. **Sorting and Searching :**
   - **A. Sorting :** Insertion sort; Selection sort; Exchange sort (Bubble, Quick); Merge sort; Heap sort.
   - **B. Searching :** Linear Search; Binary Search; Hashing Technique and collision handling.

4. **Stack :**
   The stack as an ADT; Representation; Stack Operations; Applications.

5. **Queue :**
   The Queue as an ADT; Representation; Queue Operations; Circular and Priority Queues; Applications.

6. **Linked List :**
   The Linked List as an ADT; Operation on Linked List; Linked Stacks and Queues; The Linked List as a Data Structure; Array implementation of Linked List; Linked List using Dynamic variable; Comparison of Dynamic and Array implementation of Linked List; Doubly Linked List; Circular Linked List.

7. **Trees :**
   Basic tree concepts; Binary Tree Operations and Applications; Binary Tree representations; Binary Tree Traversals; Threaded Binary Tree; The Huffman algorithm; Binary search tree implementation; Expression Trees; Introduction of multiway tree (B-Tree, B+ Trees, AVL Tree)

8. **Graphs :**
   Graph as an ADT; Graph Representation; Graph Traversal (Depth First Search, Breadth First Search)

❑ ❑ ❑ ❑ ❑ ❑

S.E. Sem. III [CMPN]

Discrete Structure and Graph Theory

SYLLABUS

Time : 3 Hrs. **Theory :** 100 Marks

Term Work : 25 Marks

1. **Set Theory :**
   Sets, Venn diagrams, Operations on sets; Laws of set theory, Power set and products; Partitions of sets, The Principle of Inclusion-Exclusions.

2. **Logic :**
   Propositions and logical operations, Truth tables; Equivalence, Implications; Laws of logic, Normal Forms; Predicates and Quantifiers; Mathematical Induction.

3. **Relations, Diagraph and Lattices :**
   Relations, paths and digraphs; Properties and types of binary relations; Manipulation of relations, closures, Warshall's algorithm; Equivalence and Partial ordered relations; Posets and Hasse diagram; Lattice.

4. **Functions and Pigeon Hole Principle :**
   Definition and types of functions : injective, surjective and bijective; Composition, identity and inverse; Pigeon-hole principle.

5. **Graphs :**
   Definition; Paths and circuits : Eulerian, Hamiltonian; Planer graphs, Graph coloring; Isomorphism of Graphs; Traveling salesperson problem

6. **Trees :**
   Trees, Rooted tree and path length in rooted tree; Spanning tree and minimum spanning tree; Isomorphism of trees; Weighted Trees and Prefix Codes.

7. **Algebraic Structures :**
   Algebraic structures with one binary operation-semigroups, monoids and groups; Product and quotient of algebraic structures; Isomorphism, homomorphism, automorphism; Cyclic Groups, Normal subgroup, Codes and group codes; Algebraic structures with two binary operations- rings, integral domains and fields; Ring Homomorphisms and Isomorphisms

8. **Generating Functions and Recurrence Relations :**
   Series and Sequences; Generating functions; Recurrence relations; Applications: Solving Differential equations, Fibonacci

❑ ❑ ❑ ❑ ❑ ❑

S.E. Sem. III [CMPN]

Electronics Devices and Linear Circuits

SYLLABUS

Time : 3 Hrs. **Theory :** 100 Marks

Practical & Oral: 25 Marks **Term Work :** 25 Marks

1. Bipolar Junction Transistor-BJT modelling, the hybrid equivalent model, Graphical determination of the H parameters. Negative feedback

2. Field Effect transistor: Construction of JFETs. Transfer characteristics. FET small signal Model, JFET configurations (Fixed bias, self bias, voltage divider, source follower and common gate). Common source amplifier.

3. Operational Amplifier: Introduction, block diagram representation. Analysis of equivalent circuit, the ideal op-amp, open loop op-amp configuration.

4. Practical op-amp– Input offset voltage, input bias current, Input offset current, Total output offset voltage, Thermal drift, effect of variation in power supply voltage on offset voltage, Common mode configuration and common mode rejection ratio.

5. General linear application, Comparators and Converters : AC – DC amplifier, Summing amplifier, Instrumentation amplifier, the integrator, the differentiator, zero crossing detector, Schmitt trigger, Analog to digital and Digital to analog converter.

6. Timer & voltage regulator : The IC 555 timer, monostable and astable multivibrator, PLL, voltage regulator (fixed, adjustable, switching regulator).

❑ ❑ ❑ ❑ ❑ ❑

S.E. Sem. III [CMPN]

Applied Mathematics – III

SYLLABUS

Time : 3 Hrs. **Theory :** 100 Marks

Term Work : 25 Marks

1. **Laplace Transform :**
   - Function of bounded variation, Laplace Transform of standard functions such as *l*, t^n, e^{at}, sinat, cosat, sinhat, coshat.erf(t).
   - Linearity property of Laplace Transform. First Shifting property, second shifting property, Change of scale property of Laplace Transform.

     $L\{t^n f(t)\}, L\left\{\frac{f(t)}{t}\right\}, L\left\{\int_0^t f(u)du\right\}, L\{f^n(t)\}$

     Heaviside Unit step function. Direct Delta function. Periodic functions and their laplace Transform.
   - Inverse Laplace Transform: Linearity Property, use of theorems to find inverse Laplace Transform, Partial fractions method and convolution theorem (without proof).
   - Applications to solve initial and boundary value problems involving ordinary differential equations with one dependent variable.

2. **Matrices (I) :**
   - Types of matrices, Adjoint of a matrix, Inverse of a matrix, orthogonal matrix, unitary matrix, Rank of a matrix, reduction to normal form PAQ, Linear dependence and independence of rows/columns over a field.
   - System of homogeneous and non-homogeneous equation, their consistency and solutions.

3. **Fourier Series :**
   - Orthogonal and orthonormal set, Expressions of a function in a series of orthogonal functions. Dirichlet's conditions. Fouries series of periodic function in the interval [c, c + 2π] [c, c + 2*l*].
   - Dirichlet's theorem even and odd functions. Half range sine and cosine series. Parsevel's identities (without proof)
   - Complex form of Fouries series
   - Practical harmonic analysis

4. **Fourier Transform :**

   Introduction, Fourier integrals-Fourier sine and cosine integrals, Fourier sine and cosine transform, Linearity property, change of scale property, shifting property, convolution theorem (without proof)

5. **Z-transform :**
   - Z-transform of standard functions such as $Z(a^n)$, $Z(n^p)$, Linearity property, damping rule, shifting rules, Initial & Final value theorem, convolution theorem (all without proof) idea of Inverse Z-transform.

6. **Use of Scilab(Computer Software) to solve integral transform.**

❑ ❑ ❑ ❑ ❑ ❑

S.E. Sem. III [CMPN]

Presentation and Communication Techniques

SYLLABUS

Term Work : 50 Marks

1. **Communication in a business organization :**
   Internal and external communication, Types of meetings, strategies for conducting successful business meetings, documentation (notice, agenda, minutes, resolution) of meetings. Introduction to modern communication techniques.
   (e-mail, internet, video-conferencing, etc.) Legal and ethical issues in communication (Intellectual property rights: patents, TRIPS, Geographical indications).

2. **Advanced technical writing :**
   Report writing : Definition and importance of reports, qualities of reports, language and style in reports, types of reports, formats (letter, memo, project-reports). Methods of compiling data for preparing report.
   A computer-aided presentation of a technical project report based on survey-based or reference based topic. The topics are to be assigned to a group of 8 – 10 students. The written report should not exceed 20 printed pages.
   Technical paper-writing, writing business proposals.

3. **Interpersonal skills :**
   Introduction to emotional intelligence, motivation, Negotiation and conflict resolution, Assertiveness, team-building, decision making, time-management, persuasion.

4. **Presentation skills :**
   Elements of an effective presentation, Structure of a presentation, Presentation tools, Audience analysis, Language: Articulation. Good pronunciation. Voice quality, Modulation, Accent and Intonation.

5. **Career skills :**
   Preparing resumes and cover letters. Types of Resumes, Interview techniques: Preparing for job interviews. facing an interview, verbal and non-verbal communication during interviews, observation sessions and role-play techniques to be used to demonstrate interview strategies (mock interviews).

6. **Group discussion ;**
   Group discussions as part of selection process. Structure of a group discussion, Dynamics of group behaviour, techniques for effective participation, Team work and use of body language.

❑ ❑ ❑ ❑ ❑ ❑