S.E. Sem. III [INFT]

Communication & Presentation Skills

SYLLABUS

Term Work : 25 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.

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S.E. Sem. III [INFT]

Digital Logic Design and Applications

SYLLABUS

Time : 3 Hrs. **Theory :** 100 Marks
Oral : 25 Marks **Term Work :** 25 Marks

1. **Number System :**
   Decimal, Binary, Octal and Hexadecimal number system and conversion, Binary weighted codes and inter−conversion, Binary arithmetic including 1's Complement 2's Complement, Error detection and correction codes.

2. **Boolean Algebra and Combinational Logic :**
   Boolean Algebra theorems, Realization of switching functions using logic gates, canonical logic forms, sum of product & product of sums, Karnaugh maps, Simplification of expressions, Variable Entered Maps, Quine−McCluskey minimization techniques, Mixed logic combinational circuits and multiple output functions.

3. **Analysis and Design of Combinational Logic :**
   Introduction to combinational circuit, Decoder, Encoder, Priority encoder, Multiplexers as function generators, Binary adder, Subtracter, BCD adder, Binary comparator, Arithmetic and logic units.

4. **Sequential Logic :**
   Sequential circuits, Flip−flops, Clocked and edge triggered flip−flops, Timing specifications, Asynchronous and synchronous counters, Counter design with state equations, Registers, Bidirectional Shift registers.

5. **Programmable Logic Devices :**
   PLAs, PALs, CPLD, FPGA Architectures, Finite state machines – Mealy and Moore design, Introduction to VHDL, Implementation of above combinational and sequential circuits using VHDL, Examples of system design applications like Washing machine, Candy Vending machine, traffic lights

6. **CAD Tools :**
   Introduction to Computer Aided Synthesis and Optimization, Circuit models, Synthesis, Optimization, Computer Aided Simulation, Verification, Testing and Design for Testability.

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SYLLABUS

Time : 3 Hrs. **Theory :** 100 Marks
Practical : 50 Marks **Term Work :** 25 Marks

1. **Revisiting Java programming construct**
   Classes types and objects, Methods, Expressions, Control flow, Arrays, input and output, Packages, Utilities in the java. lang package

2. **Object Oriented Design & Analysis of Algorithms**
   Inheritance and polymorphism, Exceptions, Interfaces, Abstract Classes, and Casting, Recursion and Other Design patterns, Pseudo – Code, Simple justification Techniques.
   Measures algorithmic complexity, Space complexity, Time complexity, Some mathematics needed in measuring complexity, The big O-notation used in measuring complexity.

3. **Stacks, Queues and Recursion**
   Recursion, Stacks, Queues, Linked Lists, Double – ended Queues.

4. **Vectors, Lists and Sequences**
   Vectors and Array Lists, Lists, Sequences, Favourite lists and the move – to Front Heuristic.

5. **Trees**
   The tree Abstract Data Type, basic Algorithms on Tree, binary Tree, data Structures for representing Tree.

6. **Priority queues**
   The priority queues Abstract data Type, Implementing a Priority queues with a List Heaps, Adaptable priority queues.

7. **Maps and dictionaries**
   The Map Abstract data Type, Hash Tables, The dictionary data Type, Skip Lists, Extensions and Applications for dictionaries.

8. **Search Trees**
   Binary Search Trees, AVL Trees, Splay Trees, (2, 4) Trees, Red – Black Trees, External searching in B – Trees.

9. **Sorting Sets and Selection**
   Merge Sort, Heap Sort, Quick Sort, and A Lower Bound on comparison Based Sorting.
   BUCKET Sort and radix Sort, the complexity of some sorting algorithms, comparison of Sorting Algorithms, The Set ADT and union / file Structures.

10. **Text Processing**
    String operations, Pattern Matching Algorithms, Tries, Text compression, Text similarity Testing.

11. **Graphs**
    The graph Abstract Data Type, Data Structures for Graphs, Graph Traversals Directed Graphs, Weighted Graphs, Shortest Paths, Minimum spanning Trees.

S.E. Sem. III [INFT]

Electronic Devices and Circuits

SYLLABUS

Time : 3 Hrs. **Theory :** 100 Marks
Oral : 25 Marks **Term Work :** 25 Marks

Objective of the course : The course intends to provide an overview of the principles, operation and application of the analog building blocks for performing various functions. This first course relies on elementary treatment and qualitative analysis and makes use of simple models and equation to illustrate the concepts involved. Detailed knowledge of the device structure and imperfection are not to be considered.

1. **Introduction to BJT amplifiers :**
   - Principles of operation of BJT, DC biasing, Fixed Bias, Collector to Base Bias, Voltage Divider Bias circuits.
   - Small signal operation and analysis of CE, CB, CC amplifier configuration
   - SPICE simulation example of amplifier

2. **Differential Amplifiers :**
   - Types of differential amplifier, Differential amplifier with swamping resistors, DC analysis.
   - AC analysis, Differential gain, common mode gain, CMRR
   - Constant current bias, current mirror circuits.
   - SPICE simulation example of differential amplifier.

3. **Operational Amplifiers and its general linear applications :**
   - Block diagram representation, Ideal Op–amp, Equivalent circuit, Openloop configuration, Transfer characteristics. Op–amp with negative feedback, Frequency response. Popular Op–amp IC 741 specifications and performance characteristics.
   - Basic op–amp applications : Adder, Scalar, Subtractor, Difference amplifier, I–V converter, V–I converters, Integrator, Differentiator, Instrumentation amplifier using 2 and 3 op–amp stages.
   - SPICE simulation of Op–amp.

4. **Active Filters and Oscillators :**
   - First order low pass Butterworth filter, Second order low pass Butterworth filter, First order high pass Butterworth filter, Second order high pass Butterworth filter, Band pass filter, Band reject filter, All pass filter
   - Oscillator : principle, Phase shift oscillator, Wein bridge oscillator, Quadrature oscillator, amplitude stabilization in oscillators.
   - SPICE simulation of Filters and Oscillators.

5. **Signal generators and wave shaping circuits :**
   - Op-amp used as basic comparator, Zero crossing detector, Schmitt trigger comparator and transfer characteristics.
   - Precision rectifier circuits, Peak detector, clamping circuit.
   - Square wave generators, Triangular wave generator, Saw tooth wave generators
   - Astable multivibrator, Monostable multivibrator
   - Data Converters : Analog to digital converter and Digital to analog converter principles, D–A converter with binary weighted resistors, D–A converter with R–2R Ladders. Successive approximation A–D converter
   - SPICE simulation examples.

6. **Specialized IC applications :**
   - Timer IC 555 and its use as monostable and astable multivibrator, Specifications and performance characteristics.
   - Voltage regulator IC 723 and its use as variable voltage regulator, Specifications and performance characteristics.

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G U I and Database Management

SYLLABUS

Time : 3 Hrs. **Theory :** 100 Marks
Practical : 50 Marks **Term Work :** 25 Marks
Oral : 25 Marks

1. **Data base concepts and Systems :**
   Introduction – Purpose of Database Systems, Views of data, Data Models, Database language, Transaction Management, Storage Management, Database Administrator, Database Users, Overall System Structure, Different types of Database Systems.

2. **E–R Model :**
   Basic Concepts, Design Issues, Mapping Constraints, Keys, E–R Diagram, Weak Entity set, Extended E–R features, Design Of an E–R Database Schema, Reduction of an E–R schema to Tables.

3. **Relational Model :**
   Structure of Relational Database, The Relational Algebra, Views SQL–Background, Basic Structure, SET operations, Aggregate functions, Null Values, Nested Sub queries, Derived Relations, Views, Modification of Database, Joined Relations, DDL, Other SQL features.

4. **Transaction :**
   Transaction Concepts, State, Implementations of Atomicity and durability, Concurrent Executions, Serializability, Recoverability, Transaction Definition in SQL.

5. **Concurrency Control :**
   Lock based protocol, Timestamp based protocol, Validation based protocol, Deadlock Handing, Insert and Delete operations, Concurrency in index structure.

6. **Recovery System :**
   Failure Verification, Recovery and Atomicity, Log based recovery, shadow paging.

7. **Graphical User Interface :**
   Muphy's Law of GUI Design, Features of GUI, Icons and graphics, Identifying visual cues, clear communication, color selection, GUI standard, planning GUI Design work.

8. **Visual Programming :**

9. **Sharing data and code :**
   Working with Projects, Introduction to Basic language, Using inbuilt controls and Active X controls, Creating and using classes, Introduction to collections, Using and creating Active X Components, dynamic data exchange, object linking and embedding.

10. **Creating Visual Software entities :**
    Working with text, graphics, working with files, file management, serial communication, multimedia control interfaces.

11. **Programming for the Internet :**
    Using Active X controls on the web–the internet transfer control for HTTP, FTP.

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S.E. Sem. III [INFT]

Applied Mathematics – III

SYLLABUS

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

Term Work : 25 Marks

1. **Complex Variable :**
   - Functions of complex variables : Continuity and derivability of a function, Analytic functions, Necessary condition for f(z) to be analytic, sufficient conditions (without proof); Cauchy–Riemann equations in polar form, Harmonic functions, Orthogonal trajectories; Analytical and Milne–Thomson method to find f(z) from its real or imaginary parts.
   - Complex Integration, Taylor's and Laurent's series (without proof), Cauchy's residue theorem (statement & application)

2. **Fourier Series :**
   - Orthogonal and orthonormal functions, Sine and cosine function and their orthogonal properties, Expression for a function in a series of orthogonal functions.
   - Fourier series, Dirichlet's conditions, Fourier series of periodic function, Even and Odd functions, Half range sine and cosine series, Parseval's relations.

3. **Laplace Transform :**
   - Laplace Transform of constant, trigonometric, exponential functions, shifting properties, Expressions (with proofs) for

     (i) $L\left\{t^n f(t)\right\}$ (ii) $L\left\{\frac{f(t)}{t}\right\}$

     (iii) $L\left\{\int f(u)du\right\}$ (iv) $L\left\{f^n(t)\right\}$

     Heaviside unit step functions, Dirac delta functions and their Laplace transforms, Laplace transform of periodic function.
   - Evaluation of inverse Laplace transforms, Partial fraction method, Convolution theorem.
   - Application to solve initial and boundary value problems involving ordinary differential equation with one dependent variable.

4. **Matrices :**
   - Types of matrices, Adjoint of a matrix, Elementary transformations of a matrix, Inverse of a Matrix using Elementary transformations, Reduction to normal form, rank using normal form Systems of homogeneous and non homogeneous equations, their consistency and solution.

5. **Scilab :**
   - Introduction to Scilab : Mathematical Functions, Tools, Arrays & their applications.

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