

S.E. Sem. III [EXTC]
Digital Logic Design

Syllabus

Time : 3 Hrs.
Oral : 25 Marks
Practical : 50 marks

Theory : 100 Marks
Term Work : 25 Marks

Objective

Objectives of this course is to introduce to the students the basics of digital systems and its applications which are extensively used in computation and data processing, control systems, communication and measurements.

Pre-requisite Concept of Diode, BJT and FET switching

1. Introduction to digital systems, comparison of digital and analog systems, number systems and conversion, binary arithmetic, codes, basic operations, Boolean laws, universal gates, derived gates.
2. System definition, input – output relation, truth table formation, system equation in terms of minterms maxterms, SOP and POS forms. System equation reduction techniques – Boolean algebra, k-maps, quine-mcCluskey method. Implementation using basic and universal gates.
3. Combinational circuits – code conversion, adders, subtractors multiplexers, de – multiplexers, encoders, decoders, PLDs, CPLDs, FPGAs. Design of combinational circuit as a solution to given problem.
4. Sequential circuits – latches, flip – flops, registers, counters.
5. General models of sequential circuit, derivation of state tables, state graphs, reduction of state tables, state assignment.
6. Introduction to logic families and analysis of TTL, ECL and CMOS.



S.E. Sem. III [EXTC]
Electronic Devices and Circuits – I

Syllabus

Time : 3 Hrs.
Oral : 25 Marks

Theory : 100 Marks
Term Work : 25 Marks

Objective To understand the analysis and synthesis/design of BJT and JFET and diode applications.

To understand the concept of design.

Pre-requisite DC/AC network theorems.

1. Biasing of BJT :

DC operating point, BJT characteristics and parameters, all biasing, with and without emitter resistance, analysis of above circuits and their design, variation of operating point and its stability.

2. Small Signal BJT amplifiers :

AC equivalent circuit, R_{in} , A_v , A_i , R_o , hybrid re model and their use in amplifier design. BJT as switch, BJT as a diode, emitter coupled pair, design considerations. Design of CE, BJT amplifier.

3. Biasing of FET :

Types of FET, characteristics and parameters of JFET, D-MOSFET, E-MOSFET, different biasing circuits, their analysis and design, location of operating point and its stability CMOS devices.

4. Small signal FET amplifiers ;

AC operating point, R_{in} , A_v , R_o , common source, common drain, common gate characteristics. Design of CS, JFET amplifier.

5. Power Circuits :

Design of rectifier circuit with Filters (L, LC, C Multiple LC, L and pi section) and regulator design using zener, BJT in series, BJT in shunt.

6. Power switching and control devices :

Characteristics, ratings and applications of silicon controlled switch (SCS), Schottkey diode, DIAC, TRIAC, UJT, PUT, photo transistor, light activated SCR, optical couplers, IGBT, Power MOSFET.



S.E. Sem. III [EXTC]
Electronic Instrumentation

Syllabus

Time : 3 Hrs.
Oral : 25 Marks

Theory : 100 Marks
Term Work : 25 Marks

Objective To understand Basic principles of Electronic Measurements. To understand Principles of Advanced Electronic Instruments and its applications.

Pre-requisite The course begins with linear DC and AC circuits and familiarizes the students with standard measurement tools. The relationship between time and frequency domain measurements of circuits is a fundamental component.

1. Sensors for Transducers :

Potentiometers, Differential Transformers Resistance Strain Gauges, Capacitance Sensors, Eddy-Current Sensors, Pizeoelectric, Photoelectric, RTD, Thermisters, Thermocouple Sensors.

2. Oscilloscopes

Specifications of general purpose Oscilloscope, Controls, sweep modes, applications Digital storage oscilloscope and its feature like Roll, Refresh, and sampling rate, applications of DSO in Communication, recent trends in oscilloscope technology.

3. Signal Analyzers.

Introduction to total harmonic distortion, wave analyzer and its applications, FFT analyzer and Network analyzer and their applications

4. Measuring Instruments and Test Equipments

True RMS meter, Q meter, Standard AC and DC sources, Instruments for digital and analog circuit testing and automatic test equipment.

5. Converters and digital Instruments

A/D and D/A converters and their types, specifications, data loggers, significance of $3\frac{1}{2}$ and $4\frac{1}{2}$ digit, Automation in digital instruments, DMM, Digital frequency meter, Universal counter and their applications like event, ratio, totalizing and timers etc.

6. Data Transmission Techniques

Introduction to data transmission techniques, Pulse modulation, digital modulation techniques like Amplitude shift Keying, Phase shift Keying, telemetry and its applications in Instrumentation.



S.E. Sem. III [EXTC]
Electrical Networks

Syllabus

Time : 3 Hrs.
Practical : 50 Marks
Oral : 25 Marks

Theory : 100 Marks
Term Work : 25 Marks

Objective To understand Basic principles and components of Electrical, Electronic circuit elements.

Pre-requisite Fundamentals of DC and R-L-C AC networks requisite

1. Network Analysis :-

DC Network Analysis with independent and dependent sources, AC Network analysis. Coupled coils-mutual inductance.

2. Graph Theory :

Fundamental definitions, The Incidence matrix, The loop matrix and cut-set matrix, Loop, Node and Node-pair definitions.

3. Time response of first and second order systems :

Initial conditions, Evaluation and Analysis of Transient and steady state responses using classical technique and Laplace Transform.

4. Network Functions :

Network functions for the one port and two port networks, Driving point and transfer functions, Poles and Zeros of Network functions and constraints on their locations, Time domain behaviour as related to the Pole- Zero plot. Draw Bode plot for all types of network functions.

5. Two-port parameters :

Open circuit, short circuit, transmission and hybrid parameters, relationship between parameter sets, reciprocity and symmetry conditions, inter-connection of two-port networks, T and Pi representation, Terminated two-port networks.

6. Elements of realisability theory :

Causality and Stability, Hurwitz polynomials, Positive real functions.

Fundamentals of Network Synthesis (for driving point functions only) :

Elementary Synthesis Procedures, Properties and synthesis of L-C, RC and R-L impedance and admittance functions, synthesis of R-L-C functions.



S.E. Sem. III [EXTC]
Applied Mathematics – III

Syllabus

Time : 3 Hrs.

Theory : 100 Marks

1. Laplace Transforms :

1. Definition, linearity property, Laplace transform of standard functions $\sin at$, $\cos at$, $\sinh at$, $\cosh at$,.
2. First shifting theorem, Second shifting theorem, $L\{t^n f(t)\}$, $L\left\{\frac{f(t)}{t}\right\}$, $L\left\{\int_0^t f(u)du\right\}$, $L\{f^n(t)\}$,
Change of scale property (All theorems with proof).
Convolution theorem (without proof)
3. Laplace transform of Periodic functions, Error Function, Heaviside Unit Step function and Dirac-delta function.

2. Matrices :

1. Inverse Laplace transforms, Solution of Ordinary differential equations using the Laplace transform method.
2. Types of Matrices-Symmetric, Skew-symmetric, Hamilton, Skew-Hamilton, Orthogonal and Unitary Matrices.
3. Inverse of a Matrix using Adjoint of a Matrix.

3. Matrices :

1. Echelon form, Rank of a Matrix, Normal Form. PAQ in the Normal form
2. System of Homogeneous and Non homogeneous equations, their consistency and solution using rank of a Matrix
3. Linear Dependence and independence of vectors.
4. Solution of a system of simultaneous linear equations using Gauss elimination method. Gauss-Jordan reduction method. Gauss-Seidel iterative method.

4. Fourier Series :

1. Definition, Dirichlet's conditions (statement only). Fourier series of functions with period. Euler's formulae (with proof).
Fourier series of functions having Arbitrary period $2L$. Fourier series of odd and even functions.
2. Half range Fourier series, Parseval's identity (without proof),
Complex form of Fourier Series, Orthogonal and Orthonormal functions.

5. Fourier Transforms :

1. Idea of Fourier Integral representation, Fourier sine and cosine integral representation. Fourier Sine and Cosine Transforms. Linearity property. Change of Scale property, Shifting property.
2. Convolution theorem (Statement only) and related problems.

6. Z-Transforms :

1. Sequence, Representation of a sequence, Basic operations on sequences, Definition of Z transforms, Linearity property (without proof). Z transforms of standard sequences – $\sin k$, $\cos k$, $\cosh k$, $\sinh k$, $\sin k$, $\cos k$
2. Change of scale property, Shifting property. Inverse Z transforms, Convolution theorem (statement only).
3. Inverse transform by Direct division, Binomial expansion and partial fraction method.



S.E. Sem. III [EXTC]
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.

