SEMESTER - I

Paper - V :   Electronics - I

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Max. Marks: 55
Time: 3 Hrs

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Note: Nine questions will be set and students will attempt 5 questions. Question No. 1 will be compulsory consisting of 4 parts based on the conceptual aspects of the whole syllabus. The answers should not be in yes/no. In addition to Question No. 1 there will be four Units in the question-paper each containing two questions belonging to four Units in the syllabus. Students will select one question from each unit.

UNIT - I

Network Theorems : Kirchhoff's Current and Voltage Law, Maximum Power Transfer Theorem, Node Method, Mesh Method, Millman Theorem, Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Two-Port Networks, Equivalent Circuits, Integration, Differentiation using RC Circuits, Clipping, Clamping, Phase and Phasor diagrams of R-C, L-C, R-L, R-L-C Circuits.

Junction Diodes: Rectifying Diode, Forward and Reverse Bias Characteristics, Varactor Diode, Light Emitting Diode, Zener Diode, Tunnel Diode.

Bipolar Junction Transistor: Basic working Principle (Qualitative), Characteristics, Basic Configurations and Biasing, Operating Point, Load Line, Biasing for stabilization of Operating Point.

UNIT - II

JFET and MOSFET : Basic working Principle (Qualitative), Characteristics, Pinchoff Voltage.

Unijunction Transistor: Basic Working Principle (Qualitative), Characteristics.

Power Control Devices : Four Layer Diode (PNPN), Silicon Controlled Rectifier (SCR), Triac, Diac, Principles and Characteristics and Applications i.e. SCR as rectifier and Triac as Power Controller in Single Phase.

Transducers: Commonly used Transducers like LDR, Thermistors. Thermocouples, Photodiodes, Photo Transistors, IR Detectors, MVDT, Strain Gauge, Application of Transducers in Temperature, Pressure, Light Intensity, Humidity Measurements.

Power Supplies: Regulated Power Supply, Zener Regulated Power Supply, Series and Shunt Regulated Power Supply, Three Terminal ICs Power Supply. Load Regulation and Line Regulation. Switched Mode Power Supply: Design Principle and Application.

Amplifiers : Different Terms used in Amplifiers, such as Signal, Source, Input, Output, Voltage and Current Gain, Power Gain, Decibel, Input and Output Impedance. Classification according to the Frequency Response, RC Coupled Class A Common Emitter Amplifier, Introduction to the Class B Operation.

Feed back in Amplifier: Effect of Negative Feedback on Amplifier Performance, Push-Pull Amplifiers: Phase Splitter circuits, Complementary Push-Pull, Thermal runway, Heat sinks.

UNIT - IV

Oscillators: Positive Feedback, Barkhausen Criteria, Phase Shift Oscillators, Wien Bridge Oscillator, Tuned Oscillator, Hartley, Colpits-Oscillators, Crystal Oscillator.

Operational Amplifier : Differential Amplifier, OPAMP inverting and Non-inverting Inputs, Virtual Ground, Parameters such as Input Impedance, Output Impedance, Open Loop Gain, CMRR, Measurements of Parameters.

Operational Amplifier: OPAMP as Inverting and Non-inverting Amplifier, Summing and Difference Amplifier, Comparator, Differentiator and Integrator, Instrumentation Amplifier, PLL (Phase Lock Loop). Non-linear Applications of OPAMP.

References

1. Electrical Engineering - V. Del. Toro

2. Integrated Electronics - Millman Halkias

3. Basic Electronics - B.L. Theraja

4. Instrumentation - A.K. Shahni

5. Fundamental of Electronics - J.D. Ryder

6. Network Analysis - Van Valkenburg

7. Measurement and Instrumentation - W.D. Cooper.