

## 2.11 30302 ELECTRICAL DEVICE & CIRCUIT

### UNIT-1 VACUUM TUBES

- 1.1 Types of emissions.
- 1.2 Brief idea of construction, characteristics, working and applications of
  - 1.2.1 Diode Valve.
  - 1.2.2 Triode Valve.
  - 1.2.3 Tetrode Valve.
  - 1.2.4 Pentode Valve.
  - 1.2.5 Photo Tube.

### UNIT-2 SEMICONDUCTOR AND PN JUNCTION

- 2.1. Metal, non-metals and semiconductors and their Energy Band Diagram.
- 2.2 Intrinsic and Extrinsic Semiconductors.
- 2.3 Effect of temperature on extrinsic semiconductor
- 2.4 Energy band diagram of extrinsic semiconductor
- 2.5 Fermi Level and fermi Dirac distribution
- 2.6 Drift and diffusion current
- 2.7 Hall effect
- 2.8 P-N Junction Diode
  - 2.8.1 Space charge region, Barrier potential and effect of temperature
  - 2.8.2 Energy band diagram
  - 2.8.3 Biasing of diode.
  - 2.8.4 V-I characteristics
  - 2.8.5 Static and dynamic resistance
  - 2.8.6 Transition and diffusion capacitance
  - 2.8.7 Zenner and Avalanche breakdown
- 2.9 Working, characteristics and application of
  - 2.9.1 Tunnel diode
  - 2.9.2 Zener diode
  - 2.9.3 Varactor diode
  - 2.9.4 Photo diode
  - 2.9.5 Light emitting diode (LED)
- 2.10 Photo conductors
- 2.11 Cds photo conductive cells and photo voltaic cell.

### UNIT-3 BIPOLAR JUNCTION TRANSISTOR (BJT)

- 3.1 Constructional details of PNP and NPN transistors
- 3.2 Working of a transistor
  - 3.2.1 Charge transport phenomenon
  - 3.2.2 Transistor amplifying action
  - 3.2.3 Relation between different currents in a transistor
  - 3.2.4 Simple problems

- 3.3 Configuration of transistor (CB, CE and CC)
- 3.4 Behavior of BJT in Active, Cut off and Saturation regions
  - 3.4.1 Transistor as a switch
  - 3.4.2 Transistor as an amplifier

#### **UNIT-4 TRANSISTOR BIASING AND BIAS STABILITY**

- 4.1 D.C. and A.C. Load line.
- 4.2 Operating point and its stability
- 4.3 Factors affecting bias stability
- 4.4 Stability factors
- 4.5 Bias stabilization
- 4.6 Calculation of operating point and stability factor for
  - 4.6.1 Fixed Bias Circuit.
  - 4.6.2 Collector to base biasing.
  - 4.6.3 Voltage Divider biasing (Self bias)
- 4.7 Bias Compensation techniques using
  - 4.7.1 Diode.
  - 4.7.2 Thermistor and Sensistor.
- 4.8 Thermal stability and Thermal runaway

#### **UNIT-5 SMALL SIGNAL TRANSISTOR AMPLIFIER**

- 5.1 CB, CE and CC amplifier and their low frequency small signal equivalent circuit using hybrid parameters.
- 5.2 Calculation of voltage gain, current gain, input impedance, output impedance and power gain for resistive loads. ( $A_v$ ,  $A_i$ ,  $Z_i$ ,  $Z_o$ ,  $A_{vs}$ ,  $A_{is}$ , and  $A_p$ )
- 5.3 Analysis of emitter follower circuit
- 5.4 Approximate analysis of CE amplifier with and without  $R_E$ , Emitter follower circuits
- 5.5. Classification of amplifiers

#### **UNIT-6 FIELD EFFECT TRANSISTOR**

- 6.1 Construction, operation and characteristics of JFET, E and D MOSFET
- 6.2 Biasing of FET
- 6.3 Small signal model of JFET
- 6.4 Terminology used with JFET
- 6.5 Precaution for handling of MOSFETs

#### **UNIT-7. RECTIFIERS AND POWER SUPPLIES**

- 7.1 Working of rectifiers
  - 7.1.1 Half wave rectifier
  - 7.1.2 Centre tap full wave rectifier
  - 7.1.3 Bridge rectifier
- 7.2 Analysis of rectifiers (for all type)
  - 7.2.1 Calculations for average and RMS values

7.2.2 PIV of diodes

7.2.3 Ripple factor

7.2.4 Regulation and efficiency

7.3 Calculation of ripple factor and working of following filters:

7.3.1 Capacitance filter

7.3.2 Inductance filter

7.3.3 L-C and  $\pi$  (Pie) filters

7.4 Voltage Multipliers

7.5 Regulated power supply using Zener diode

7.5.1 Simple problems on Zener regulator.

**Reference Books:**

1. Electronic Devices & Circuits Millman & Halkias
2. Electronic Devices & Circuits G.K. Mittal
3. Electronic Devices & Circuits A.Mottershed
4. Functional Electronics K.V. Ramanan
5. Electronic Devices & Circuits Mathur, Kulshrestha&Chadda
6. Electronic Devices & Circuits Sanjeev Gupta

