24225

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

Marks

1. Attempt any FIVE of the following : **10**

(a) Sketch energy band diagram of insulator and semiconductor.

(b) State types of JFET and draw its symbol with terminal names.

(c) Draw symbol of NPN and PNP transistor.

(d) State any two applications of FET.

(e) Define : Load Regulation and Line Regulation.

(f) Draw basic block diagram of a DC regulated power supply.

(g) Define the term 'knee-voltage' of P-N junction diode. Give knee voltage of Si diode.

2. Attempt any THREE of the following : **12**

(a) Describe experimental set-up for operation of P-N junction diode in forward bias. Draw its characteristics.

(b) Sketch input and output characteristics of CE configuration. Label various regions on characteritics.

(c) Sketch circuit diagram of transistorized series voltage regulator and explain its working.

(d) Explain the concept of DC load line and operating point.

3. Attempt any THREE of the following : **12**

(a) State the values of the following parameters with reference to full wave bridge rectifier :

(i) Ripple Factor

(ii) Efficiency

(iii) TUF

(iv) PIV

(b) Sketch circuit diagram of positive biased clipper using diode and explain its working.

(c) Derive relationship between transconductance (gm), amplification factor (μ) and drain resistance (r_d) of FET.

(d) State any four applications of regulated D.C. power supply.

4. Attempt any THREE of the following : **12**

(a) Draw circuit diagram for π filter and explain its working with waveform.

(b) Explain working of NPN transistor with neat circuit diagram.

(c) For common base (CB) configuration of BJT, if I_E = 2 mA and I_B = 20 μA, calculate value of I_C and current gain α (alpha).

(d) Compare EMOSFET and DMOSFET.

(e) With the help of reverse characteristics of zener diode, explain its use as a regulator.

5. Attempt any TWO of the following : **12**

(a) Explain drain characteristics of JFET with ohmic region, saturation region cut-off region and breakdown region.

(b) An AC supply of 230 V is applied to HWR through a transformer with turns ratio of 10 : 1. Find (i) average DC output voltage, (ii) average DC output current (iii) PIV of diode, also (iv) rms value of voltage and current. (Assume $R_L = 10\ k\Omega$)

(c) Sketch constructional diagram of LED and state its three applications.

6. Attempt any TWO of the following : **12**

(a) Describe classification of solids on the basis of energy band diagram.

(b) Sketch the circuit diagram of center-tap full-wave rectifier and explain its working with input and output waveforms.

(c) Explain with circuit diagram voltage divider biasing method for BJT.
