# ELEMENTS OF ELECTRONICS ENGINERING

## ENGINERING

### Paper–EL-101E

Time Allowed : 3 Hours]          [Maximum Marks : 75

**Note :** Attempt five questions in all, selecting at least one question from each Unit. Question No. 9 is compulsory.

## UNIT–I

1. (a) Explain, why temperature coefficient of resistance of a intrinsic semiconductor is negative ?          3

   (b) Explain the formation of depletion region in an open circuit p-n junction diode. What is the effect of forward and reverse bias on depletion region ?          7

   (c) What do you understand by a clamping circuit ? Explain, how p-n junction diode may be used as positive clamper.          5

2. (a) Design a voltage regulator that will maintain an output voltage of 20V across a load of 1KΩ with an input that may vary between 30V and 50 volts.          8

   (b) Draw the circuit of centre tapped full wave rectifier and explain its operation with the help of waveforms.          7

## UNIT–II

3. (a) Draw the block diagram of voltage series feedback in amplifier. How negative feedback modify the gain of Amplifier ?          5

(b) Discuss the input and ouput characteristics of CE NPN transistor in detail. 10

4. (a) What do you understand by biasing ? Explain the working of fixed biasing and voltage divider biasing circuit with help of accurate analysis. 10

(b) Draw the expression for frequency of oscillation of Wein bridge oscillator. 5

## UNIT–III

5. (a) Derive the relation between CMRR and Vout of op-amp. How CMRR may be maximized ? 7½

(b) What are the characteristics of Ideal op-amp ? Derive . the expression for the gain of non-inverting Amplifier. 7½

6. (a) Differentiate between sensors and transducers. Give some examples of various sensors and transducers. 5

(b) Explain the working of op-amp as integrator with output waveforms. 7

(c) Define (i) CMRR (ii) Slew rate (iii) Input bias current. 3

## UNIT–IV

7. (a) Explain construction, working and characteristics of Depletion-Enhancement MOSFET. 8

(b) Explain the working principle of CRO. Discuss its applications for measuring frequency and phase shift of waveforms. 7

8. (a) Explain turn on and turn off characteristics of SCR. How SCR may be used as controlled rectifier ? 7½

(b)  Define various JFET parameters. Also prove that

$$gm = \frac{-2I_{DSS}}{V_P} \left[ 1 - \frac{V_{GS}}{V_P} \right].$$

7½

(Compulsory Question)

9.  (a)  Why there is constant current in JFET after pinch off ?

(b)  Derive the relation between α and β.

(c)  Why Si type transistors are more often used than Ge type transistors ?

(d)  Define PIV in rectifier circuit.

(e)  Why FET is unipolar device ?

(f)  Discuss need of biasing.

(g)  What is PSRR in op-amp ?

(h)  How does LED emit light ?

(i)  Why transistor action cannot be achieved by connecting two diodes back to back ?

(j)  Define Miller's theorem.

1½×10=15