

Roll No. ....

Total Pages : 3

BT-1/D-12

8006

## ELEMENTS OF ELECTRONICS ENGINEERING

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  $1K\Omega$  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 output 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  $V_{out}$  of op-amp. How CMRR may be maximized ?  $7\frac{1}{2}$
- (b) What are the characteristics of Ideal op-amp ? Derive the expression for the gain of non-inverting Amplifier.  $7\frac{1}{2}$
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 ?  $7\frac{1}{2}$

- (b) Define various JFET parameters. Also prove that

$$g_m = \frac{-2I_{DSS}}{V_P} \left[ 1 - \frac{V_{GS}}{V_P} \right] \quad 7\frac{1}{2}$$

**(Compulsory Question)**

9. (a) Why there is constant current in JFET after pinch off ?  
 (b) Derive the relation between  $\alpha$  and  $\beta$ .  
 (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