

Roll No. ....

Total Pages : 3

**GSE/M-20**

**1480**

PHYSICS

(Semiconductor Devices)

Paper-II

Time : Three Hours]

[Maximum Marks : 40

**Note :** Question No. 1 is compulsory. Attempt *four* more questions selecting *one* question from each unit. All questions carry equal marks. Use of non-programmable calculator is allowed.

**Compulsory Question**

1. (i) What is Avalanche and Zener breakdown? (2)
- (ii) What is leakage current in a transistor? (2)
- (iii) Why we deliberately use negative feed back in amplifiers though it reduces gain considerably? (2)
- (iv) What is meant by a time-based voltage? (2)

**UNIT-I**

2. (i) Discuss High Pass RC filter analysis. (5)
- (ii) What is LED? Describe its mechanism. How are different coloured LED made? (3)

3. (i) Explain the principle and construction of a solar cell. (5)  
(ii) Draw energy band diagram of N-type semi-conductor and explain it. (3)

### UNIT-II

4. (i) Draw Voltage Divider Biasing Circuit and explain its working. (5)  
(ii) The D.C. current gain of a transistor in CE configuration is 100. Find the current gain in CB configuration. (3)
5. (i) Draw a circuit and explain working of PNP transistor. (4)  
(ii) Derive the following relation :

$$\gamma = \frac{1}{1 - \alpha} \text{ and } \gamma = 1 - \beta. \quad (4)$$

### UNIT-III

6. (i) Draw a circuit for common base amplifier and explain its working. (5)  
(ii) An amplifier has a voltage gain of 10,000. If the negative feed back is applied to input circuit, the voltage gain reduces to  $\frac{1}{100}$  of its value without feed back. Calculate the feed back factor. (3)

7. (i) Discuss the circuit of a Emitter follower. why it is named so? (5)
- (ii) Why is fixed bias not preferred? (3)

#### UNIT-IV

8. (i) Draw a circuit for Hartley Oscillator. Explain its working. (6)
- (ii) What are the basic requirements of a oscillator? (2)
9. (i) Give the principle, block diagram of CRO. Discuss its uses. (5)
- (ii) Discuss Barkhausen's criterion for sustained oscillations. (3)
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