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 :

$$\gamma = \frac{1}{1-\alpha} \text{ and } \gamma = 1 - \beta.$$ (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, black diagram of CRO. Discuss its uses. (5)

(ii) Discuss Barkhausen's criterion for sustained oscillations. (3)

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