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Department of Physics
B.Sc. Semester-III Internal Examination, 2023
Paper – PHSACOR10T
ANALOG ELECTRONICS

FULL MARKS -20

TIME -1 hr

A. ANSWER ANY TWO ($2 \times 5 = 10$)

1. Why is Si not used as a LED material? Which type of semiconductor is suitable for manufacturing LED?
2. "As a semiconductor device material Si is superior to Ge"-Explain.
3. What do you mean by an ohmic metal-semiconductor contact? How is such a contact produced?
4. "The barrier potential across a p-n junction diode cannot be measure simply by placing a volt meter across the diode terminal"-explain.
5. What do you mean by static and dynamical resistance of a diode? How does the dynamical resistance vary with current and temperature?
6. What is Schottky Diodes?
7. A transistor has a collector current of 5 mA and a base current of $20\mu A$. Find the values of α & β .
8. In a transistor the collector to base current with the emitter open is $I_{CBO} = 10\mu A$ at room temperature. It is used in CE mode. Find I_C when $I_B = 50\mu A$. Assume $\beta = 100$.

B. ANSWER ANY TWO ($5 \times 2 = 10$)

1. Consider the circuit of Fig 1 with $V_{BB} = 10$ V and $V_{CC} = 20$ V, $R_B = 310k\Omega$, $R_C = 5k\Omega$. It is found that for fixed base current of $30\mu A$ the collector current changes from 3.5 mA to 3.7 mA when the collector-emitter voltage changes from 7.5 V to 12.5 V.
(a) Calculate its output resistance and β at $V_{CE} = 12.5$ V. What will be its α ?
(b) Also, calculate V_{CE} if $\beta = 125$. Assume that $V_{BE} = 0.7$ V.
2. Find the Q -point of the emitter feedback bias circuit of Fig. 6.5 – 1 with the following circuit parameters: $V_{CC} = 12$ V, $R_C = 4.7k\Omega$, $R_B = 250k\Omega$, $R_E = 1k\Omega$, $\beta = 100$. Assume $I_{CBO} \ll I_B$

OR

Find the Q -point of the collector-base feedback biasing circuit of Fig. 6.6-1 with the following circuit parameters: $V_{CC} = 20$ V, $R_C = 4.7k\Omega$, $R_B = 680k\Omega$ and $\beta = 100$. Assume $I_{CBO} \ll I_B$

3. Explain the terms:
(i) rating of a transistor (ii) maximum collector dissipation hyperbola and (iii) thermal runaway.
4. (a) What do you mean by load line and Q -point of a transistor amplifier?
(b) Explain the significance of load line. What are the criteria for selecting the position of Q -point in an amplifier?
(c) What are the factors that affect the bias stability of a transistor?

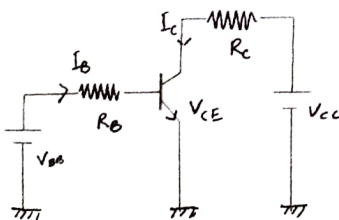


Fig.1