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Total No. of Questions : 09]

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**B.Tech. (Sem. - 3<sup>rd</sup>)**

**ELECTRONIC DEVICES AND CIRCUITS**

**SUBJECT CODE : EE - 207**

**Paper ID : [A0405]**

[Note : Please fill subject code and paper ID on OMR]

**Time : 03 Hours**

**Maximum Marks : 60**

**Instruction to Candidates:**

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

**Section - A**

**Q1)**

**(10 x 2 = 20)**

- a) Distinguish between Semiconductors and Insulators.
- b) What is dynamic resistance of a crystal diode? Prove that  $r = \frac{\eta V_T}{I}$ .
- c) Draw the circuit for OR gate using pn junction diodes.
- d) Find the value of  $\beta$  if  $a = 0.99$  for a transistor.
- e) Which is the heavily doped among Base, Emitter and Collector in a transistor and why.
- f) Why voltage divider bias is used in amplifiers?
- g) Distinguish between JFET and BJT.
- h) Compare positive and negative feedback employed in amplifiers.
- i) Draw the block diagram for Current shunt feedback circuit.
- j) In an op-amp  $R_F = 10 \text{ K}\Omega$  and  $R_1 = 1 \text{ K}\Omega$ . If the  $I_{10} = 200 \text{ nA}$ . Determine output offset voltage due to this current.

## Section - B

(4 x 5 = 20)

- Q2) What is a Schottky diode and how it works. List at least one application.
- Q3) What is an amplifier and why CE configuration is mostly used in amplifiers.
- Q4) What is thermal run away and how it can be avoided? Explain.
- Q5) The gain and distortion of the amplifier are 150 and 5% without feedback. If 10% of its output voltage applied is fed back as negative feedback, find the distortion of the amplifier with feedback.
- Q6) An LM 312 op-amp is used as an inverting amplifier with following specifications:

$$\frac{\Delta V_{os}}{\Delta T} = 30 \mu V / ^\circ C \quad \frac{\Delta I_{os}}{\Delta T} = 10 nA / ^\circ C \quad R_1 = 1 K\Omega \text{ and } R_F = 4.7 K\Omega$$

Assume that op-amp is nulled at 25°C. A sine wave of 10 mV peak amplitude at 100 Hz is applied. Draw the output voltage waveform at 45°C.

## Section - C

(2 x 10 = 20)

- Q7) Draw the circuit diagram and explain the working of a CC. Why it is called emitter follower.
- Q8) List the advantages and disadvantages of negative feedback in amplifiers. Prove your statements.
- Q9) The 741 op-amp having the following parameter is connected as a non-inverting amplifier, with  $R_1 = 1 K\Omega$  and  $R_f = 10 K\Omega$ , for  $A = 2 \times 10^5$ ,  $R_i = 2 M\Omega$ ,  $R_o = 75 \Omega$ ,  $f_o = 5 Hz$ . Assuming the supply and output swing voltages, Compute  $A_F$ ,  $R_{iF}$ ,  $R_{oF}$ ,  $f_F$ . Also find these values, if it voltage follower?

