Roll No. ..... Total Pages : 4

CMDQ/D-23 **4437**

ELECTRONIC DEVICES AND CIRCUITS–I

Paper–PHY–104

Time Allowed : 3 Hours] [Maximum Marks : 60

Note : Attempt **five** questions in all, selecting **one** question from each Unit. Question No. **1** is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) What are ohmic contacts? How these are made? 3

   (b) How one can control the reverse saturation current I_{CO} in a BJT amplifier? 3

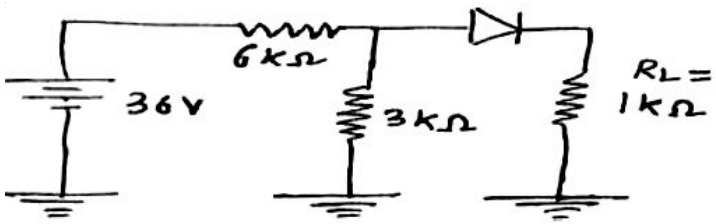
   (c) What are cross-over distortions? How these can be eliminated? 3

   (d) Justify the need of composite amplifier designs. 3

UNIT–I

2. (a) A semiconductor is doped with both donors and acceptors of concentrations N_D and N_A, respectively. Develop expressions from which to determine the electron and hole concentrations. 6

   (b) Calculate the load voltage, load current and diode power of the following circuit using Thevenin's theorem. Take the forward voltage drop across the diode 0.7V. 6



3. (a) Justify the need of clamping circuits. Further explain the operation of clamping circuit which can clamp a sinusoidal signal at + V_R volts. 6

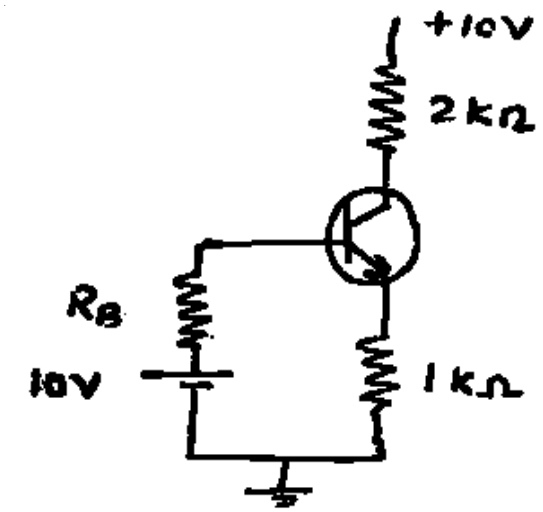
   (b) Find the resistivity of intrinsic Si at 300K. Also find the resistivity of it if it is doped with n type impurities to the extent of 1 part in 10^8 Si atoms. Take Si atoms/cm^3 = 5×10^{22}, μ_n=1300cm^2/Vs and μ_p= 500cm^2/Vs. 6

UNIT–II

4. (a) Under what operating conditions, an h-parameters model is developed for BJT amplifiers? Further develop an h-parameters model for a CC BJT amplifier. 6

   (b) What do you understand by bias compensation techniques? Explain one such technique to deal with I_{CO} variations. 6

5. (a) In the circuit shown, if V_{BE}= 0.6V, β = 50, and I_C = 4V. Determine the values of R_B, I_B and V_{CE}. 6



(b) Discuss the effect of negative feedback on the input resistance of an amplifier. 6

UNIT–III

6. (a) Describe CE-CC and CC-CC Darlington pair amplifiers. 6

(b) Discuss the low and mid frequency response of a direct coupled CE amplifier. 6

7. (a) What are various noises present in an amplifier circuit? How can noise present in an amplifier be quantified? 6

(b) Draw the circuit diagram of a two stage RC-coupled CE amplifier and explain the role of each component in the circuit. Also discuss its mid frequency response. 6

UNIT–IV

8. (a) Describe, through suitable mathematical expressions, the performance of a Zener diode shunt voltage regulator. Also list its advantages and disadvantages. 6

(b) Describe the operation of a class-B push-pull amplifier. Further mention its advantages and disadvantages. 6

9. (a) What are heat sinks and how we can design heat sinks for power amplifier circuits? 6

(b) Explain the operation of shunt BJT voltage regulator and also find an expression for its input regulation factor. 6