Total No. of Questions—8] [Total No. of Printed Pages—4

BE–III/6(B)

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(I.T. Engg.)

BASIC ELECTRONICS—COURSE NO. ECE-313

Time Allowed—3 *Hours* *Maximum Marks*—100

Note :— Attempt *five* questions in all, by selecting at least *one* question from each Unit. *All* questions carry equal marks.

Unit I

1. (*a*) Explain in detail Zener diode and its break-down phenomenon in detail with neat diagram. 10

(*b*) Explain with neat diagram the working of LED, photodiode and varactor diode. 10

Or

2. (*a*) Explain and derive an expression for I_{avg}, V_{avg}, I_{rms}, V_{rms}, ripple factor, TUF, PIV, η in case of full wave bridge rectifier with neat diagram. 12

(*b*) The reverse current of Si diode is found to be 50 nA at 27°C with 10 V reverse voltage. The junction temp. was observed to rise upto 105°C. Calculate the maximum value of reverse current at temp. 105°C. 8

Unit II

3. (a) Explain with neat diagram the working of transistor in common collector configuration and draw the I/P and O/P characteristics. Show the active, saturation and cut-off region. How characteristics can be modified by early effect ? 12

(b) A p-n-p transistor has $\beta = 50$ $I_{CO} = 2$ μ Amp. A C.E. configuration is used with $V_{CC} = -12$ V and $R_C = 4$ kΩ. What is the minimum I_B required to saturate the transistor shown in Fig. 1. Use $V_{CE(sat)} = -0.2$ V

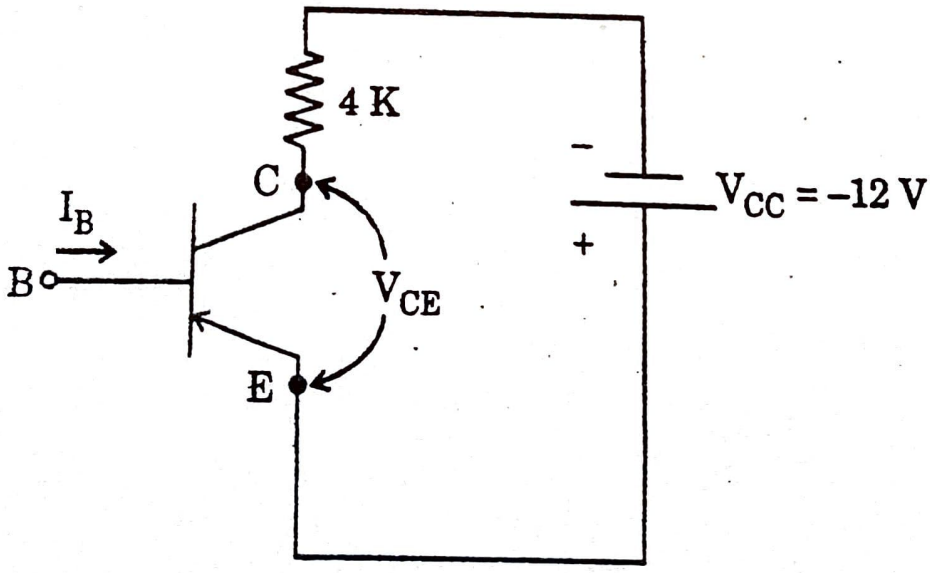

Fig. 1

Or

4. (*a*) Explain the concept of thermal runaway in transistors. Also explain the Bias compensation technique for compensation of I_{CO}. 10

(*b*) Explain in detail the transistor components. Also write the Generalized Transistor Equation. 10

Unit III

5. (*a*) Draw and explain the JFET small signal model and write equation. 5

(*b*) Draw the low frequency model of JFET in C.S. configuration and derive the expression for A_v, R_i, R_o with and without R_s. 15

Or

6. (*a*) Explain with neat diagram, working of depletion MOSFET. Draw symbol, characteristics. 10

(b) A C.S. FET amplifier with unbypassed R_s has the following parameters :

R_d = 15 kΩ, R_s = 0.5 kΩ, R_g = 1 mΩ, r_d = 5 kΩ, g_m = 5 $m\mho$, V_{DD} = 20 V. Calculate A_v, R_i, R_o. Draw the load line also. 10

Unit IV

7. (a) Explain the working of op-amp as voltage follower and inverter. Draw the I/P and O/P waveform in each case. 10

(b) Explain the working of op-amp as summing, scaling and average amplifier in case of N. Inv. amplifier. 10

Or

8. (a) Explain the working of op-amp as voltage limiters and comparators. 10

(b) Explain the working of op-amp as integrator and differentiator. 10