Code : ESC-202 (101302)

B.Tech 3rd Semester Special Exam., 2020

(New Course)

BASIC ELECTRONICS

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Answer/Fill in the blanks/Write true or false (any *seven*) : 2×7=14

(a) Why is filter required to be added after rectifier circuit?

(b) What is the application of voltage regulator?

(c) DC value of pure AC waveform is _____.

(d) Which of the transistor currents is always the largest?

(e) What is the source of leakage current in a transistor?

(f) What is the major difference between a bipolar and a unipolar device?

(g) Give the advantage of negative feedback in amplifier.

(h) BJT amplifier changes the frequency and shape of the signal.

(i) CMMR for ideal operational amplifier is _____.

(j) Slew rate for ideal operational amplifier is _____.

2. *(a)* Draw volt-ampere characteristics of a Zener diode. What is meant by the knee voltage in the curve?

(b) Describe in detail the avalanche breakdown mechanism in a diode. 6+8=14

3. *(a)* Explain the principle of operation of LED with the help of diagram.

(b) Derive the expression for I_C in terms of I_E and α_{dc} for a common-base BJT configuration. For a given α_{dc} of 0·998, determine I_C if I_E = 4 mA. 6+8=14

4. *(a)* Define the stability factor. What does smaller stability factor indicate?

   (b) Derive the expression for stability factor for voltage divider bias (self-bias) circuit. 5+9=14

5. *(a)* Explain the construction and characteristics of FET.

   (b) Draw and explain *h*-parameter small signal model for BJT. 7+7=14

6. *(a)* Explain the working of common emitter amplifier with the help of circuit diagram.

   (b) What are the roles of coupling and bypass capacitors? Explain in detail. 8+6=14

7. *(a)* Describe the RC phase-shift oscillator with circuit diagram.

   (b) Explain the working of high-frequency LC oscillator with the help of circuit diagram. 6+8=14

8. *(a)* Explain the working of voltage series feedback amplifier with the help of block diagram.

   (b) Design an integrator using op-amp and explain its working. 7+7=14

9. *(a)* Write the circuit diagram of differential amplifier configurations and explain its working.

   (b) Explain about CMRR, slew rate and concept of virtual ground. 7+7=14

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