Total Pages—5

(Set-P)

B. Tech-2nd

Basic Electronics

Full Marks : 70

Time : 3 hours

Answer six questions including Q. No. 1 which is compulsory

The figures in the right-hand margin indicate marks

Symbols carry usual meaning

1. Answer *all* questions : 2×10

(a) What is the significance of virtual ground of an OPAMP?

(b) Differentiate between analog, digital and discrete signal with suitable diagram.

(c) What is the range of n bit signed binary number?

(d) Consider a 4 bit digital word $D = b_3 b_2 b_1 b_0$ used to represent an analog signal V_A that varies between 0 V and +15 V. Find the values of D correponding to $V_A = 0$ V, 1 V, 2 V and +15 V.

(Turn Over)

(e) What is biasing ? What should be the condition for proper biasing ?

(f) What is slew rate of an operational amplifier ? What is its significance ?

(g) Realise an EX-OR gate using NOR gate.

(h) What is time base voltage ? Why the time base voltage is generally given to *X* plate of a CRO ?

(i) Perform the following operation and express the answer in octal form :

$$(336)_8 - (737)_8 + (775)_{16}$$

(j) Differentiate between AM and FM.

2. (a) Draw the circuit diagram of the bridge type full-wave rectifier and explain how it works. 5

(b) Derive the relationship between Alpha (α), Bita(β) and Gama(γ). In a PNP transistor operating in the active region, the emitter current $I_E = 8$ mA and alpha (α) = 0·95. Compare the collector current I_C and base current I_B Neglect I_{CO}. 5

(Continued)

integrator circuit ? Also draw the output form when 4 V peak to peak square wave voltage is applied. 5

(b) Define I_{CBO} and I_{CEO}. Derive an expression to find the relation among them. 5

4. (a) Find the values of the valued variables A, B, C, and D by solving the set of simultaneous equations

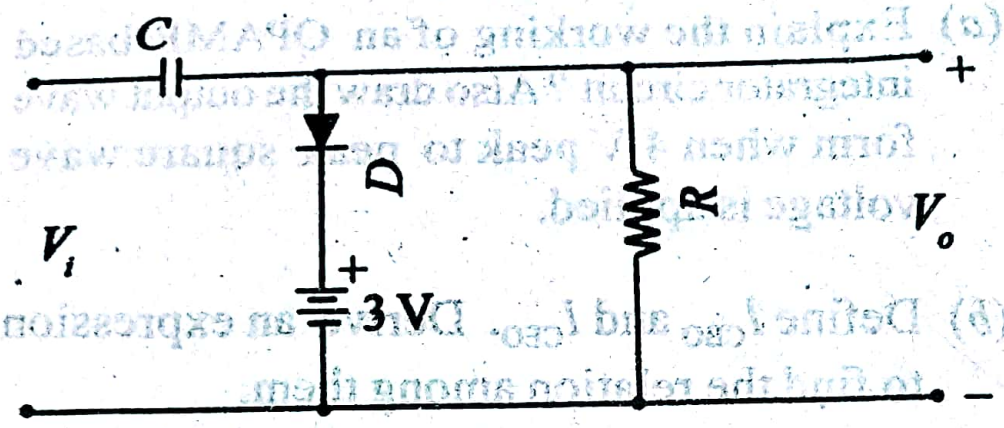
$$AA' + AB = 0, \quad AB = AC \quad \text{and}$$
$$AB + AC' + CD = C'D$$ 5

(b) Prove the following using Laws of Boolean Algebra : 5

(i) $AB'C + A'BC + ABC = C(A + B)$

(ii) $AB'(C + BD) + A'B' = B'C + A'B'$.

5. (a) Draw output waveform V_0 for the biased clamping circuit shown in Figure given below. Assume $V_i = 5$ V square wave. What happens to the output waveform when the diode is reversed ? 5



(*b*) Distinguished between positive and negative feedback. The open loop gain of an amplifier changes by 10 percent. If 5 dB negative feedback is applied, calculate the percentage change in the closed loop gain. 5

6. (*a*) What do you meant by race around condition ? Explain the working of J-K Flip-Flop. 5

(*b*) Explain Diode as voltage regulator. 5

7. (*a*) With appropriate block diagram, explain the principle operation of AM receiver. 5

(*b*) Explain the block diagram of CRO. 5

8. Write short notes on the following : 5 + 5

(i) Electronic Multimeter

(ii) RC High pass filter.