MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : ES-101 (PART-II)

BASIC ELECTRICAL & ELECTRONIC ENGINEERING-I

Time Allotted : 1½ Hours *Full Marks : 35*

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *five* of the following : $5 \times 1 = 5$

i) PIV of full wave rectifier is

a) V_m b) 0

c) $2V_m$ d) none of these.

ii) A diode is

a) linear b) non linear

c) both (a) and (b) d) none of these.

iii) Temperature coefficient of the Zener breakdown voltage is

a) positive b) negative

c) zero d) none of these.

iv) RF factor of half wave rectifier is

a) 0·48 b) 1·21

c) 0 d) 1.

v) Example of amorphous material

a) plastic b) rock

c) calcite d) none of these.

vi) The "Superposition theorem" is essentially based on the concept of

a) duality b) linearity

c) reciprocity d) non-linearity.

vii) Cells are connected in parallel in order to

a) increase the voltage available

b) reduce cost of wiring

c) increase the current available

d) reduce the time required to fully charge them after use.

viii) The power factor of a purely resistive circuit is

a) zero b) unity

c) lagging d) leading.

GROUP – B

(Short Answer Type Questions)

Answer any *two* of the following. $2 \times 5 = 10$

2. Write difference between metal, insulator and semiconductor.

3. Why *n-p-n* and *p-n-p* transistors are bipolar transistor ? Explain why the collector region is larger than that of the emitter and base in a transistor ?

4. Explain the mechanism of breakdown of zener diode.

5. Distinguish between half wave and full wave rectifier. Draw the circuit diagram of full wave rectifier. Define ripple factor of full wave rectifier. 2 + 2 + 1

GROUP – C

(Long Answer Type Questions)

Answer any *two* of the following. 2 × 10 = 20

6. a) Obtain and expression for electrical conductivity of semiconductor material.

b) A sample of Ge at room temperature has an intrinsic carrier concentration of $2.5 \times 10^{19}/m^3$. It is doped with 5×10^{19} As atoms/m^3. Assume that all the As atoms are ionized if the electron & hole motilities are 0·38 & 0·18 m^2/vs, respectively. determine the percentage increase in conductivity of doped Ge. 5 + 5

7. a) Define α & β. Derive the relation between them for an *n-p-n* transistor.

b) An *n-p-n* transistor with $\alpha = 0.98$ is operated in the CB configuration. If the emitter current is 3 mA & the reverse saturation current is 10 μA. What are the base & collector current ? 5 + 5

8. a) Define PIV of a diode. Give the PIV rating of the diode used in half and full wave rectifier.

b) Derive expression of (i) I_{dc} (ii) I_{rms} (iii) Ripple factor (iv) Rectification efficiency for half wave rectifier. 4 + 6

9. Write short notes on any *two* of the following : 2 × 5

a) Bridge Rectifier

b) Varactor diode

c) Linear piecewise model of diode

d) Stability factor of BJT.