BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – B.Tech.(RA)-2022/B.Tech.(RA)-2023
Course Name – Basic Electrical and Electronics Engineering
Course Code - ESCR101
(Semester I)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select, in which of the following semiconductor, the concentration of the holes and electrons is equal.
   a) Intrinsic b) Extrinsic
   c) Compound d) Elemental

(ii) Express, the SI unit of conductivity.
   a) Ωm b) (Ωm)-1
   c) Ω d) m

(iii) Identify, what does dp/dx represent.
   a) Velocity gradient b) Volume gradient
   c) Density gradient d) None

(iv) Describe, which of the following parameters can't be found with Hall Effect.
   a) Polarity b) Conductivity
   c) Carrier concentration d) Area of the device

(v) Interpret, the product of mobility of the charge carriers and applied Electric field intensity is known as:
   a) Drain velocity b) Drift velocity
   c) Push velocity d) Pull velocity

(vi) Select, the cut-in voltage of a Ge diode is about
   a) 0.3V b) 0.6V
   c) 0.2mV d) 0.6mV

(vii) Select the band gap of a semiconductor lies in the range
   a) 5 to 10 eV b) 0.2 to 2.5 eV
   c) 0.01 to 0.1eV d) None of these

(viii) Choose that the electron hole pairs are generated by
   a) ionisation b) thermal agitation
   c) recombination d) doping

(ix) Choose that at 0 K an intrinsic semiconductor behaves as a/an

a) Conductor b) Insulator
c) Semiconductor d) Any of the above

(x) Identify energy storing elements from the following

a) Resistor b) Inductor
c) Capacitor d) Both 2 and 3

(xi) Identify the nonlinear circuit element

a) Resistor b) Diode
c) Capacitor d) Both 1 and 3

(xii) Choose from the following, the law on which KVL is based

a) Law of conservation of charge b) Law of conservation of energy
c) Law of conservation of mass d) None of the above

(xiii) Identify the unit of inductive reactance from the following

a) ohm b) mho
c) siemens d) ohm-meter

(xiv) Identify the relation between the line current and the phase current in case of three phase star connection

a) line current = 1.732 x phase current b) line current = phase current
c) phase current = 1.732 x line current d) phase current = 0.5 x line current

(xv) Identify the active element from the following

a) resistor b) inductor
c) capacitor d) none of the above

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Determine the wavelength of light emitted from LED which is made up of GaAsP semiconductor whose forbidden energy gap is 1.875 eV. Mention the colour of the light emitted (Take $h = 6.6 \times 10\text{-}34$ Js). (3)

3. Distinguish between PN Junction Diode & Zener Diode (3)

4. Explain the components of no load currents of a single phase transformer and the reason of laminating the transformer core (3)

5. Define RMS value and average value of AC (3)

6. Explain what do you understand by reverse saturation current of a diode? (3)

OR

Explain, how diode acts as a rectifier? (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. In the given figure of a voltage regulator, a Zener diode of breakdown voltage 15V is employed. Determine the current through the load resistance, calculate the total current and the current through the diode. Use diode approximation. (5)

8. Describe Working Principle of PN Junction Diode. (5)

9. Explain how fifty percent efficiency is achieved in Maximum power transfer theorem (5)
10. State the different losses in a dc motor? How do you find efficiency of such a motor? (5)
11. An n-p-n transistor with alpha=0.98 is operated in the CB configuration. If the emitter current is 3 mA and the reverse saturation current is Ico=10 microA, what are the base current and the collector current? (5)

12. Explain the working Principle of Solar Cell (5)

OR

Distinguish between Zener Breakdown & Avalanche Breakdown (5)

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