BRAINWARE UNIVERSITY

Term End Examination 2023-2024

Programme – B.Tech.(CSE)-DS-2022/B.Tech.(CSE)-DS-2023

Course Name – Basic Electrical and Electronics Engineering

Course Code - ESCD101

(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) Identify the condition for which the mechanical power developed by a DC series motor is maximum?

a) Back Emf is same as the applied voltage
b) Back Emf is equal to half of the applied voltage
c) Back Emf is eqaul to infinity
d) Back Emf is eqaul to zero

(ii) Identify the particular DC motor used for having high starting torque.

a) DC shunt motor
b) Seperately excitd DC motor
c) DC series motor
d) All of the above

(iii) Identify the particular DC motor which cannot be started with noload.

a) DC shunt motor
b) Seperately excitd DC motor
c) Both 1 and 2
d) DC series motor

(iv) Identify energy storing elements from the following

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

(v) Identify energy dissipating element from the following

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

(vi) Identify the nonlinear circuit element

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

(vii) Select, in which of the following semiconductor, the concentration of the holes and electrons is equal.

a) Intrinsic
b) Extrinsic
c) Compound
d) Elemental

(viii) Indicate, Which of the following expressions doesn't represent the correct formula for Drift current density.

a) $J = \sigma E$ b) $J = qn\mu E$
c) $J = \mu E$ d) None

(ix) Express, the SI unit of conductivity.

a) Ωm b) $(\Omega m)^{-1}$
c) Ω d) m

(x) Describe, the tendency of charge carriers to move from a region of heavily concentrated charge to a region of less concentrated charge is known as:

a) Depletion current b) Drain current
c) Diffusion current d) Saturation current

(xi) Identify which of the following atoms can act as donors in Si:

a) As b) In
c) Ga d) Ge

(xii) Identify that, in an NPN transistor, the arrow is pointed towards

a) the collector b) the base
c) depends on the configuration d) the emitter

(xiii) In the operation of an NPN transistor, indicate the region that electrons can cross:

a) emitter region b) the region where there is high depletion
c) the region where there is low depletion d) P type base region

(xiv) Illustrate which of the following are true for a PNP transistor.

a) the emitter current is less than the collector current b) the collector current is less than the emitter current
c) the collector current is less than the emitter d) the holes are the minority charge carriers

(xv) Identify the type of amplifiers exhibit the current gain approximately equal to unity without any current amplification.

a) CE b) CC
c) CB d) None of the above

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain the need for a starter in a DC motor (3)
3. Define RMS value and average value of AC (3)
4. A half-wave rectifier is used to supply 50V d.c. to a resistive load of 800 Ω. The diode has a resistance of 25 Ω. Calculate a.c. voltage required. (3)

5. Estimate the conductivity and resistivity of pure Ge at 300K. Assume that at 300K intrinsic carrier concentration is $2.5 \times 10^{19} m^{-3}$, electron mobility=0.375 m^2/V-s and hole mobility =0.175 m^2/V.s (3)

6. Explain three terminals of a transistor. (3)

OR

Identify the advantages and disadvantages of Transistor. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. 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)

8. State the different losses in a dc motor? How do you find efficiency of such a motor? (5)
9. When a resistor and a coil in series are connected to a 240 V supply, a cuurent of 5A is flowing lagging 60° behind the supply voltage, and the voltage across the coil is 220 V. Calculate the resistance of the resistor and the resistance and reactance of the coil. (5)
10. Distinguish between intrinsic and extrinsic semiconductors and explain the term "Doping" (5)

11. Explain the Drift current and Diffusion current in a semiconductor device? (5)

12. Explain the working of NPN transistor. (5)

OR

Explain the working of PNP transistor (5)

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