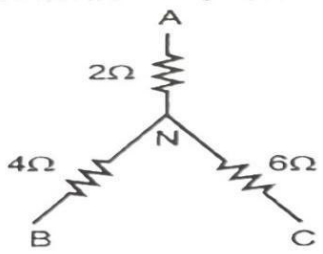
13/06/2025 FE ALL BRANCHES SEM-I (NEP-2020) BEEE QP CODE: 10083051

(2 Hours) **Max Marks:60**

N.B.: (1) Question **No.1** is compulsory.
(2) Attempt any **THREE** questions from the remaining **FIVE** questions.
(3) Assume suitable data if necessary and mention the same clearly.
(4) Figures on the right indicate the marks.

MARKS

Q1 (a) Convert the star circuit into its equivalent delta circuit (3)



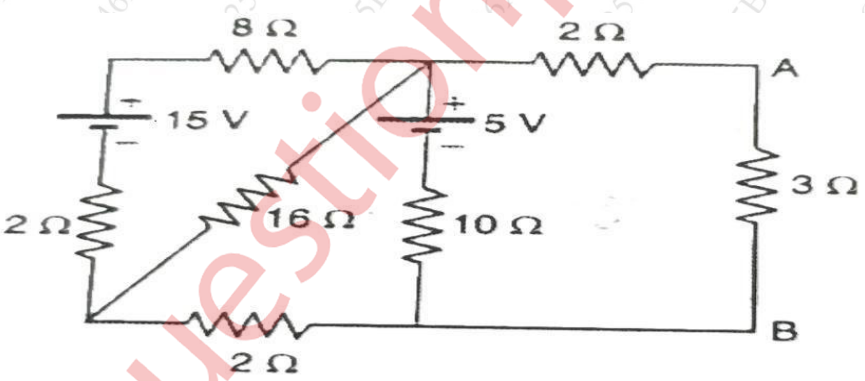
(b) Write down the relation between line current and phase current, line voltage and phase voltage, power in balanced three phase delta connected balanced load. (3)

(c) Explain the concept of back emf in a DC motor. (3)

(d) What are the losses in a single-phase transformer? (3)

(e) Draw and explain the construction diagram of LED and enlist the applications. (3)

Q2 (a) Using Norton's theorem, calculate the current through 3 Ω resistor across the terminals A and B in the given circuit. (10)

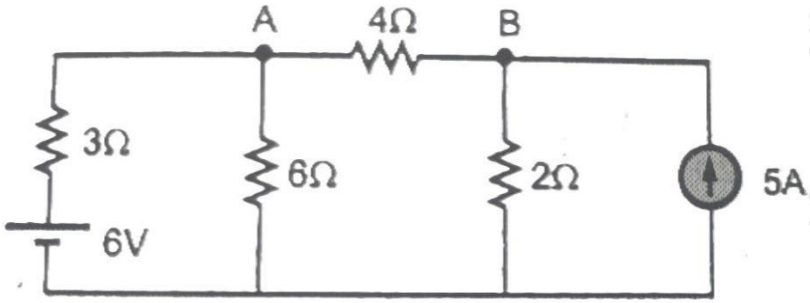


(b) Explain the working principle of three phase induction motor and mention its types. (5)

Q3 (a) An inductive coil having inductance of 0.04H and resistance 25Ω has been connected is series with another inductive coil of inductance 0.2 H and resistance 15Ω. The whole circuit is powered with 230V, 50Hz mains. Calculate the power dissipation in each coil and total power factor (10)

(b) Explain the application of Zener diode as a voltage regulator. (5)

Q4 (a) Find the current through 4Ω resistance using Nodal analysis (5)



(b) With the help of a neat circuit diagram explain the operation of a BJT as a switch. (5)

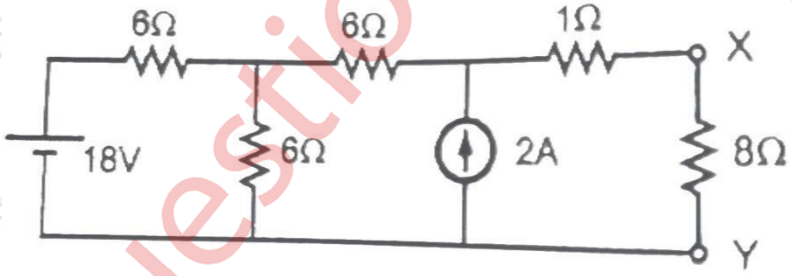
(c) What is the necessary condition for resonance in a series circuit? Derive an expression for resonance frequency. (5)

Q5 (a) Explain the working principle of single phase transformer and derive the EMF equation. (6)

(b) Explain the working principle of Brushless DC Motor. (4)

(c) A balanced 3-ϕ, star connected load consist of three coils each consisting of R= 6Ω and X_L = 8Ω. Determine the 1) Phase impedance 2) Phase voltage 3) Phase current 4) Line current 5) Power factor when connected across 400V, 50 Hz supply. (5)

Q6 (a) Using source transformation find the current flowing the 8 Ω resistance (6)



(b) A coil having a resistance of 10Ω and an inductance of 40mH is connected to a 200V, 50Hz supply. Calculate the impedance of the coil, current, power factor and power consumed. (4)

(c) Differentiate between BJT and FET. (5)

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