

(3 Hours)

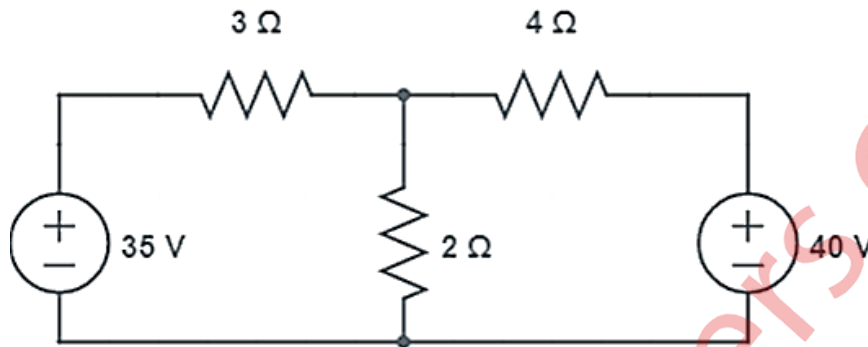
Total Marks: 80

1. Q.1 is compulsory
2. Answer any three out of the remaining questions
3. Assumptions made should be clearly stated

I. Answer any four

(i) Find current through 3Ω resistor by mesh analysis.

05



(ii) Compare star and delta connection in three phase circuits.

05

(iii) State Superposition theorem. What is its application?

05

(iv) A balanced 3- Φ , star-connected load consists of three coils each consisting of $R=6\Omega$ and $X_L=8\Omega$. Determine the phase impedance, phase voltage, phase current, line current and load power factor when the load is connected across 400 V, 50 Hz supply.

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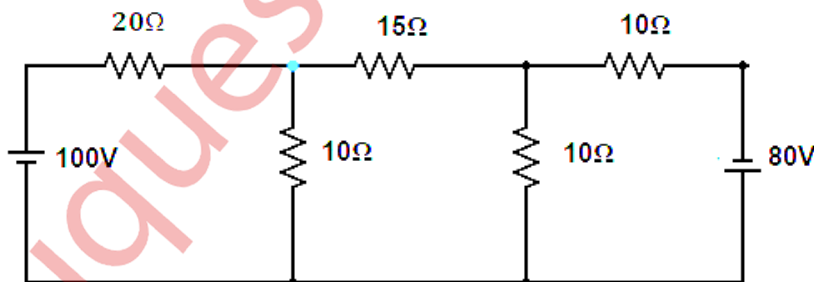
v) Derive the EMF equation of a DC machine.

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II. A) An alternating current of frequency 50Hz has a maximum value of 12A. Find the following: (i) Angular frequency in radians/sec; (ii) Equation of instantaneous value of current; (iii) Value of current after 5msec; (iv) RMS value of current and (v) Time taken to reach 9.6A for the first time.

10

B) Find the current through 15Ω through nodal analysis?



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III. A) Prove the relation between phase voltage and line voltage in a three-phase star connected system with neat phasor diagrams.

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B) A resistor of 25Ω is connected in series with a pure inductor. The series combination when connected across a 230V, 50Hz supply, draws a current of 5A which lags behind the supply voltage by 60° . Calculate (i) impedance of the circuit; (ii) reactance; (iii) inductor value; (iv) voltage drop across inductor; and (v) active power.

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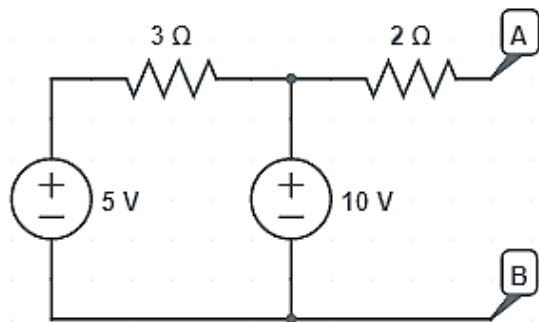
IV. A) Three similar coils each having a resistance of 5Ω and an inductance of 0.02H are connected in star to a $440\text{V}, 50\text{Hz}, 3\phi$ supply. Calculate (a) reactance and impedance of the coil b) phase voltage (c) phase current & line current (d) power factor (e) active & reactive power. 10

B) State the working of a three-phase induction motor? What are the two types of rotor? 10

V. A) Two wattmeters that are connected to measure power in a three-phase system using the two-wattmeter method, indicate 1250W and 250W respectively. Find the total power supplied and the power factor of the circuit. When i) both the readings are positive ii) when the latter reading is obtained by reversing the connections of the pressure coil. 10

B) Derive the formula for resonant frequency of a series resonant circuit? State any five conditions of series resonance. 10

VI. A) Find Thevenin's and Norton's equivalent circuit across A & B. 10



B) State and prove maximum power transfer theorem. Find the value of resistor (R_L) that will transfer maximum power in the circuit given. 10

