**Time: 3 hrs** **Marks: 80**

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

1. **Answer any four**

a) Draw a neat diagram of two wattmeter method of power measurement in three phase 05 circuits for resistive load and state any two advantages.

b) Derive the emf equation of a single-phase transformer. 05

c) State and prove Maximum Power Transfer theorem. 05

d) A balanced 3-Φ, star-connected load consists of three coils each consisting of R=6Ω and XL=8Ω. 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. 05

e) Derive the EMF equation of a DC machine. 05

2. A) Find the currents I1, I2, I3 and the current through 1Ω using mesh analysis? 10
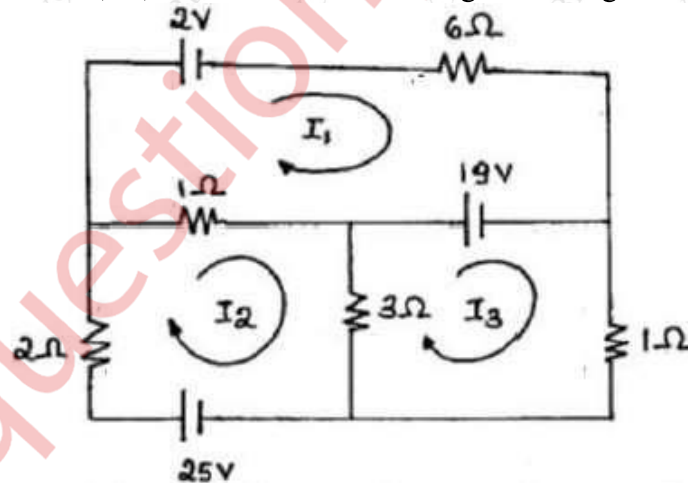
B) A circuit consists of a pure resistor and a coil in series. Power dissipated in the resistor and 10 in the coil are 1000W and 250W respectively. The voltage drops across the resistor and the coil are 200V and 300V respectively. Determine value of resistance, resistance and reactance of a coil, combined resistance and impedance of the coil and supply voltage.

3. A) An alternating voltage is represented by v(t)=141.4 sin (377t) V. 10 Find
(i) RMS value of voltage; (ii) frequency in Hz, (iii) time period in sec.,
(iv) instantaneous value of voltage at t=3ms and
(v) the time taken for the voltage to reach 70.7V for the first time.

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B) Find the current through 5Ω (Ix) using Superposition theorem without using source transformation.　　　10
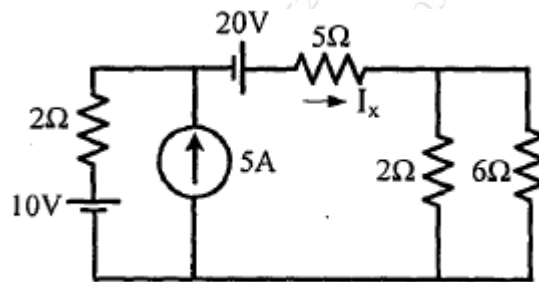
4.A) State the working of a three-phase induction motor? What are the two types of rotor?　　10
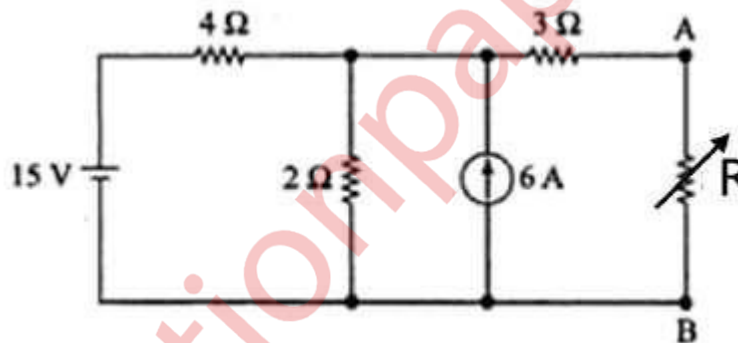
B) Prove the relation between phase voltage and line voltage in a three-phase star connected system with neat phasor diagrams.　　10

5. A) Find the value of the resistance R using maximum power transfer theorem and find the value of maximum power transferred.　　10

B) Derive the formula for resonant frequency of a series resonant circuit? Compare Series and Parallel Resonance circuit.　　10

6. A) A series RLC circuit has values R = 10 ohms, L = 10 mH, and C = 10 micro F. It is connected to a 200 V variable frequency supply. Find the resonant frequency? At resonance find, i) current drawn, ii) power consumed, iii) power factor and iv) Quality factor.　　10

B) Find the current in 4Ω resistor using source transformation.　　10

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