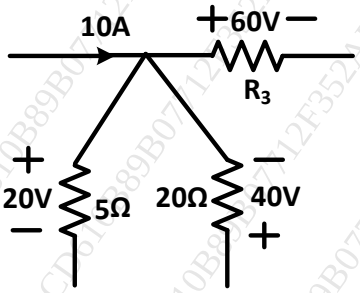
**Time: 3 Hours** **Total Marks: 80**

**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**

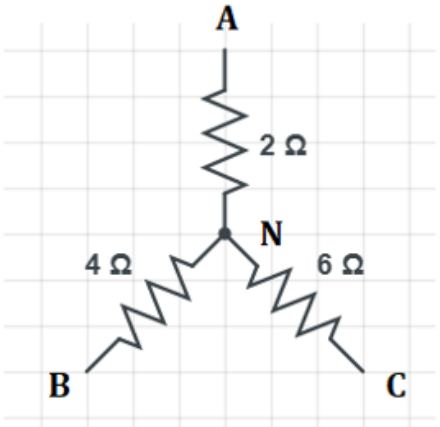
(a) An inductor of 0.2H and resistance of 10Ω are connected in series to a 230V(RMS),50Hz sinusoidal supply. Calculate (i)reactance of the inductor, (ii)impedance of coil, (iii)RMS value of current, (iv) RMS value of voltage across resistance and (v)maximum current. **05**

(b) Find value of $R_3$ in the figure given below by applying Ohm's law and Kirchhoff's laws. **05**




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

(d) Draw the equivalent delta network. Mention the formula used for the conversion. **05**




(e) Compare core type and shell type single phase transformer. **05**

II. A) Prove that the power in a balanced three phase circuit can be deduced from the readings of the wattmeters in two wattmeter method of power measurement. How to find reactive power from these wattmeter readings? **10**

B) Find the currents $I_1$, $I_2$, $I_3$ and the current through 3Ω using mesh analysis? **10**



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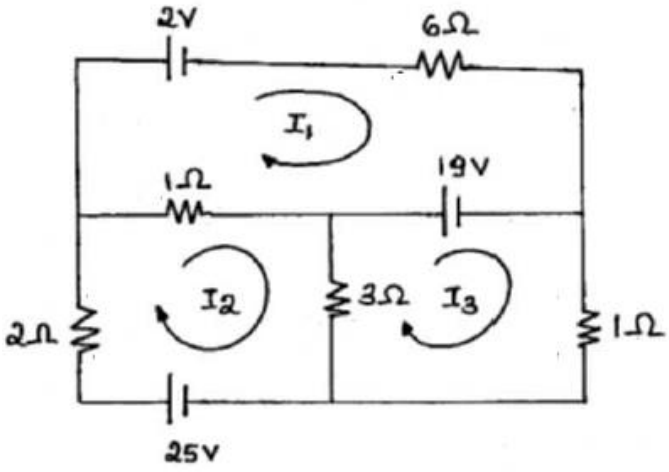


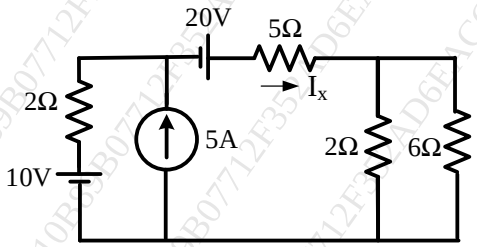

III. A) A coil having a resistance of 5Ω and an inductance of 0.1H is connected in series with a 50-μF capacitor. An alternating voltage of 200V is applied to the circuit. At what value of frequency will the current be a maximum? Calculate the following for this frequency: (i) impedance of the circuit and current; (ii) reactance of inductor and reactance of capacitor, (iii) voltages across coil and voltages across capacitor, (iv) voltage magnification across capacitor with respect to the supply voltage. **10**

B) An alternating voltage is represented by v(t)=141.4 sin (377t) V. 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. **10**

IV. A) A balanced load of phase impedance 100Ω and power factor 0.8 is connected in delta to a 400 V, 3-phase supply. Calculate (i) resistance and reactance per phase; (ii) line current; (iii) active power; (iv) reactive power and (v) apparent power. **10**

B) State different parts of a three-phase induction motor and mention the function of each part. What are the two types of induction motor? **10**

V. A) Find the current through 5Ω ($I_x$) using Superposition theorem. **10**




B) Two impedances 14+j5Ω and 18+j10Ω are connected in parallel across 200V, 50 Hz, single phase supply. Determine: (i) Admittance of each branch in polar form;(ii) Current in each branch in polar form; iii) power factor of each branch.; (iv)active power in each branch and (v) reactive power in each branch. **10**

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



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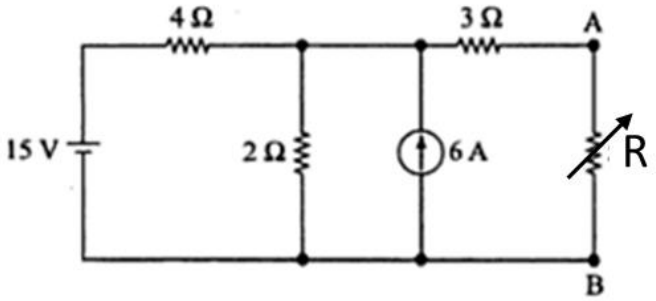


B) i) Derive the emf equation of a single-phase transformer. **05**

ii) Find the number of turns on the secondary and value of flux in a 25kVA, 3000/240V single phase transformer with 500 turns on the primary. The primary winding is connected to 3000V, 50Hz supply. Neglect all voltage drops. **05**

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