Q7) a) A coil having resistance of 7 Ω and an inductance of 31.8 mH is connected to single phase 230V 50 Hz AC supply. Calculate **[6]**

i) Impedance

ii) Current through circuit

iii) Power factor

iv) Power consumed

v) Voltage drop across resistance and inductor

b) What is series resonance? Derive the expression for resonance frequency. Draw phasor diagram for resonance condition. **[8]**

OR

Q8) a) Each phase of star connected load has an impedance 25 + j40 Ω connected across 3 phase 415 V 50 Hz supply. **[6]**

Find i) Phase and line current ii) All powers

b) Derive formula for relation between phase voltage and line voltage in delta connected resistive load. State formulae for all powers in terms of only line parameters. **[8]**

Q9) a) An 80 KVA 1000 / 250 V 50 Hz 1- phase transformer has iron loss of 800 watt and full load copper loss of 1200 watt. **[6]**

Estimate i) Efficiency at full load 0.8 power factor

ii) Efficiency at half load unity power factor

b) Compare between core and shell type of single–phase transformers **[8]**

OR

Q10) a) Explain the working principle of 3 phase squirrel cage induction motor. State any two applications. **[6]**

b) Explain the construction and working principle of DC shunt motor with suitable diagram. State any two applications of it. **[8]**

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Q3) a) A steel ring of 175 cm mean diameter has a cross - sectional area of 250 mm^2. Flux developed in the ring is 500 μwb when 3500 turns coil carries certain current. Assuming μ_r of steel to be 1250. [6]

Find i) mmf required ii) reluctance iii) current

b) Define magnetic circuit. State any 04 similarities and any 02 dissimilarities with electrical circuit. [8]

OR

Q4) a) Define reluctance. Write formula and its unit. State the formula for reluctance magnetic circuit i) having only iron path ii) having iron path & one air gap. [6]

b) With usual notation derive the formula for self-induced emf. Enlist the factors affecting self- inductance. [8]

Q5) a) If A = 25 + j 35, B = 30 < 40 and C = j 15 [6]

Find i) A + B – C ii) AB – C iii) A + BC

b) Define average value of an alternating quantity. Obtain an expression for average value in terms of maximum value. [8]

OR

Q6) a) An AC voltage of v = 250 sin (314.16t) applied to a pure capacitance of 125 μF. [6]

i) Write equation for current

ii) Draw phasor diagram

iii) Average power consumed.

b) When voltage v = Vm Sin (ωt) is applied to purely inductive circuit. [8]

i) Derive current equation

ii) State instantaneous power equations

iii) Draw the phasor diagram.

Total No. of Questions : 10]

SEAT No. : F-5007[illegible]

PE-12176

[Total No. of Pages : 3

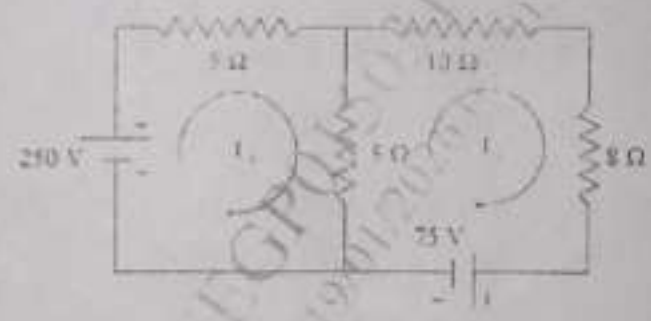
[6581]-2407
F.E.
ESC-102-ELE : Basic Electrical Engineering
(2024 Pattern) (Semester - I/II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable additional data, if necessary.*
5) *Use of non-programmable calculator is allowed.*

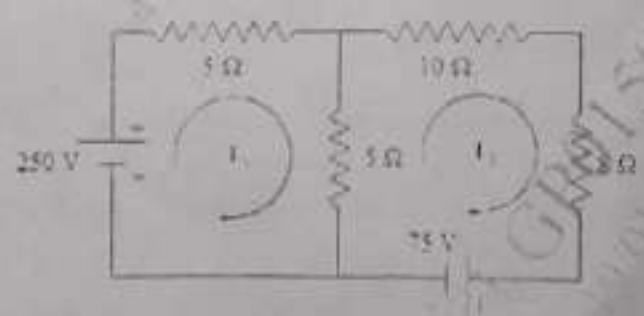
Q1) a) Find current through 8 Ohm resistance using KVL **[6]**



b) Explain typical power system with neat block diagram. Mention voltage levels of every section. **[8]**

OR

Q2) a) Find current through 8 Ohm resistance using Super position theorem **[6]**



b) Derive the formulae for conversion of delta to equivalent star connected network. Draw neat circuit diagram. **[8]**

P.T.O.