B - 892 (Pages : 03) SEM 1-4 (RC 07-08)

[Total No. of Questions : 8]

F.E. (Semester - I) (Revised in 2007-08) Examination, Nov./Dec. - 2011
BASIC ELECTRICAL ENGINEERING

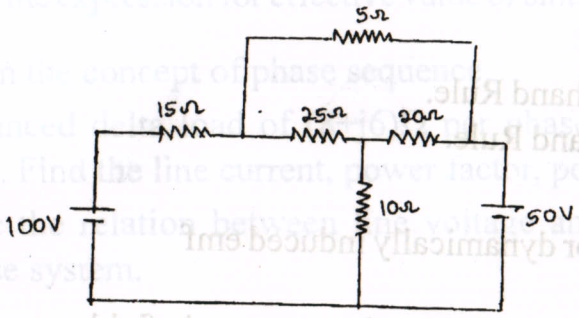
Duration : 3 Hours **Total Marks : 100**

Instruction : 1) Answer 5 questions in full with at least one question from each module.
2) Missing data, if any, may be suitably assumed.

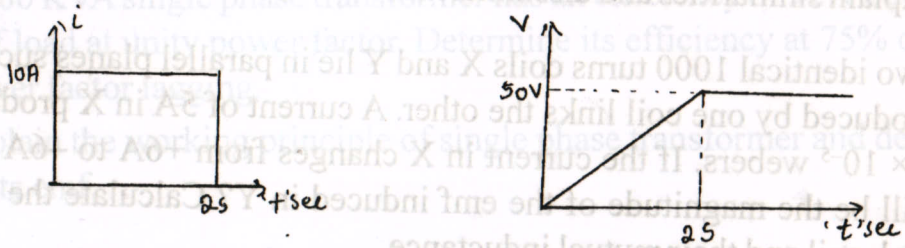
MODULE - I

Q1) a) Derive the equations for equivalent capacitance where four capacitor are connected in series and parallel. **[6]**

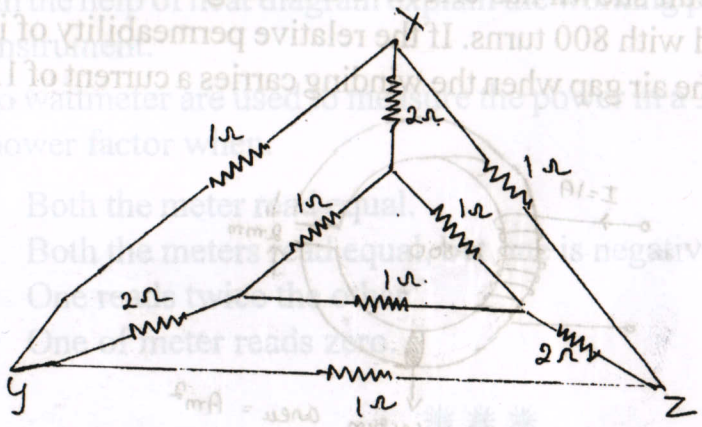
b) Using Kirchoff's laws find the current in all branches of network shown. **[8]**



c) The current and voltage waveforms of an electric device are shown in below fig. Identify the electric device and find out the value of it. **[6]**



Q2) a) Determine the resistance between X and Y of the network shown in below. State the formulae used. **[6]**



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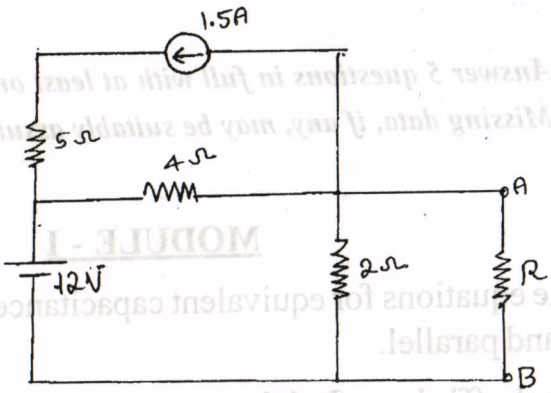
b) State Thevenin's theorem and explain using any circuit. [6]

c) For the network shown below determine the value of R for maximum power transfer across the terminal A and B and calculate the maximum power that will be delivered to R. [8]



MODULE - II

Q3) a) Explain the following : [6]

i) Fleming's Right hand Rule.
ii) Fleming's Left hand Rule.
iii) Lenz's Law.

b) Derive the equation for dynamically induced emf when [6]

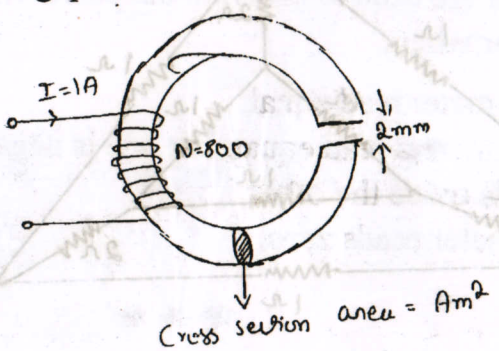
i) Conductor moving at right angle to magnetic field.
ii) Conductor is moving at an angle θ to the direction of magnetic field.

c) Explain similarities and dissimilarities between electrical and magnetic circuit. [8]

Q4) a) Two identical 1000 turns coils X and Y lie in parallel planes such that 60% of flux produced by one coil links the other. A current of 5A in X produces in it a flux of 5×10^{-5} webers. If the current in X changes from +6A to –6A in 0.01 sec. What will be the magnitude of the emf induced in Y? Calculate the self inductance of each coil and their mutual inductance. [7]

b) Derive the expression for energy stored in a magnetic field. [6]

c) A magnetic circuit shown has effective iron length of 100 cm and an air gap of 2 mm. It is wound with 800 turns. If the relative permeability of iron 1200. Find the flux density in the air gap when the winding carries a current of 1A (Neglect leakage and fringing). [7]



MODULE - III

Q5) a) Define the following : [4]

i) RMS value of current.
ii) Peak factor.
iii) Instantaneous value.
iv) Form factor.

b) Explain addition of two sinusoidal Quantities. [4]

c) An emf given by $100 \sin(314t - \pi/4)$ is applied to a circuit and the current is $20 \sin(314t - 1.5708)$ Ampers. [6]
Find :

i) Frequency.
ii) Circuit element.

d) Derive the expression for effective value of sinusoidal varying alternating current. [6]

Q6) a) Explain the concept of phase sequence. [5]

b) A balanced delta load of $(8+j6)\Omega$ per phase is supplied from a 3-phase 440v source. Find the line current, power factor, power per phase and total power. [8]

c) Derive the relation between line voltage and phase voltage in star connected 3-phase system. [7]

MODULE - IV

Q7) a) Explain the short circuit test on single phase transformer. [4]

b) A 600 KVA single phase transformer has an efficiency of 92% both at full load and half load at unity power factor. Determine its efficiency at 75% of full-load at 0.9 power factor lagging. [8]

c) Explain the working principle of single phase transformer and derive the equation of its emf. [8]

Q8) a) Explain the concept of measurement of power in 3-phase circuit using two wattmeter method. [6]

b) With the help of neat diagram explain the working principle of a dynamometer type of instrument. [6]

c) Two wattmeter are used to measure the power in a 3-phase balanced system. What is power factor when. [8]

i) Both the meter read equal.
ii) Both the meters read equal, but one is negative.
iii) One reads twice the other.
iv) One of meter reads zero.

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