

SEM 1 – 4 (RC 07-08)

F.E. Semester – I (Revised in 2007-08) Examination, May/June 2017
BASIC ELECTRICAL ENGINEERING

Duration : 3 Hours

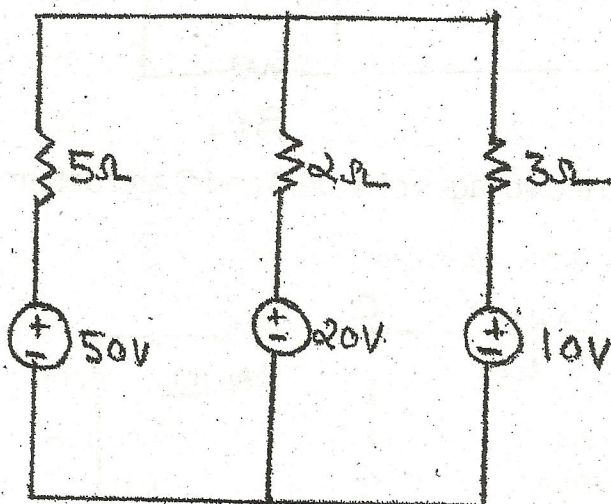
Total Marks : 100

Instructions: 1) Answer **any five** questions atleast **one** question from **each** Module.

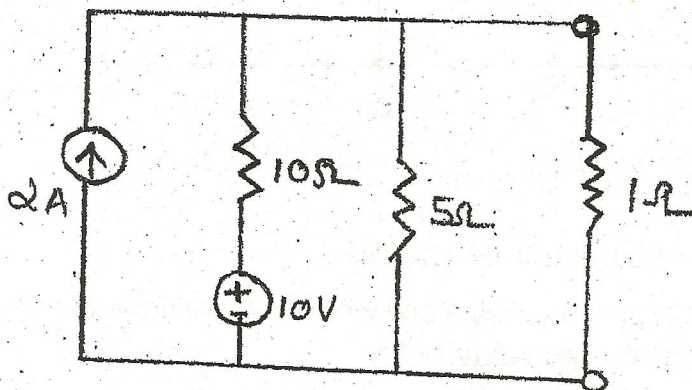
2) **Assume** suitable data if necessary.

MODULE – I

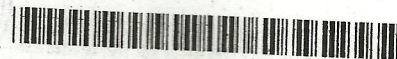
1. a) Using mesh analysis, find the current through 50 V source in the network. 7



- b) Find the power loss in the 1 Ω resistor by using Thevenin's theorem for following circuit. 6



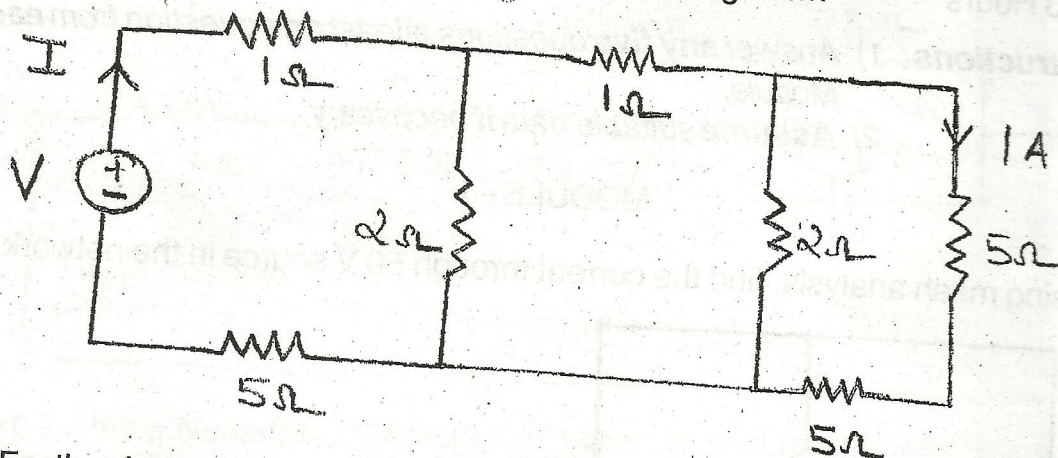
- c) Find the equivalent capacitance when three capacitances are connected in
(i) series (ii) parallel. 7



2. a) Determine the expression for connecting
- Star network to a Delta equivalent network.
 - Delta network to Star equivalent network.
- b) Find the value of I and V using Kirchhoff's voltage law.

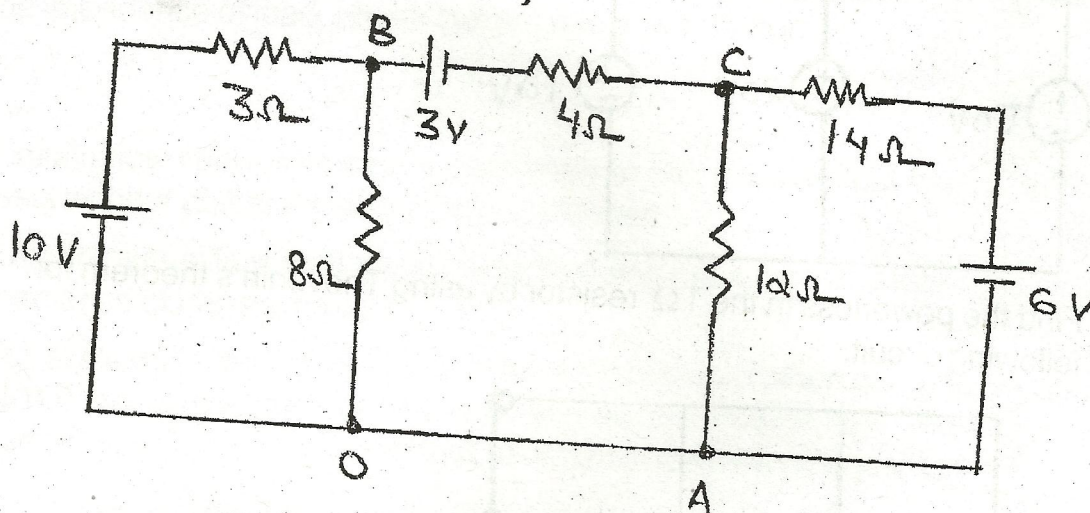
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- c) For the circuit shown in figure find the voltages of node B and C and determine current in $8\ \Omega$ resistor.

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MODULE – II

3. a) Explain the concept of self and mutual inductance.
- b) Derive an expression for energy stored by a coil when current flowing through it is changed from zero to maximum value of I .

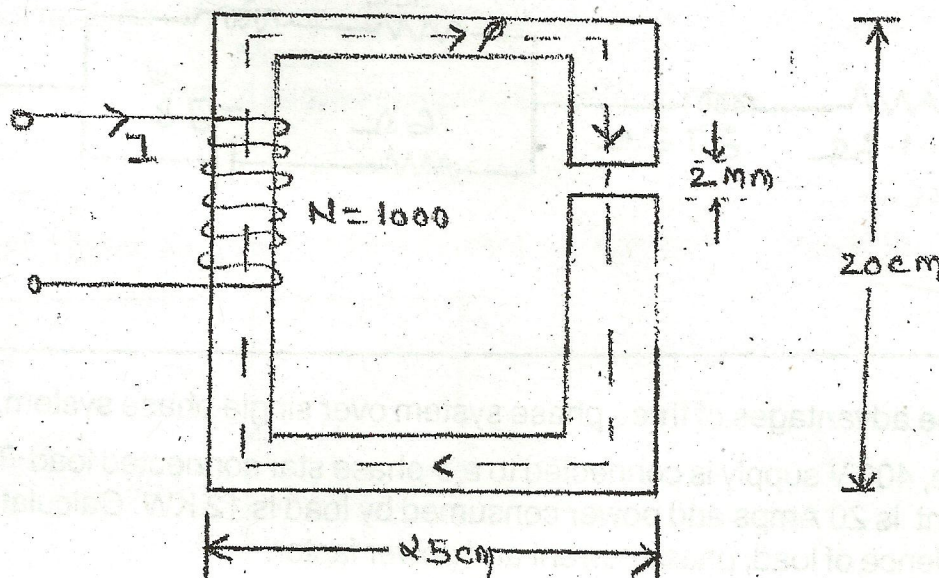
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- c) For the rectangular magnetic core as shown in figure, an airgap of 2 mm is cut across one of its limbs. Calculate the excitation current of coil, having 1000 turns to produce a core flux of 4 mwb. The relative permeability $\mu_r = 2000$ and crosssectional area is 16 cm^2 .

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4. a) Derive an expression for total MMF induced in parallel magnetic circuit having rectangular cross section and airgap. 8
- b) An iron ring of mean length 50 cm and relative permeability 300 has an airgap of 1 mm. If the ring is provided with winding of 200 turns and current of 1 A is allowed to flow through it, find the flux density across airgap. 7
- c) Explain concept of statically and dynamically induced EMF. 5

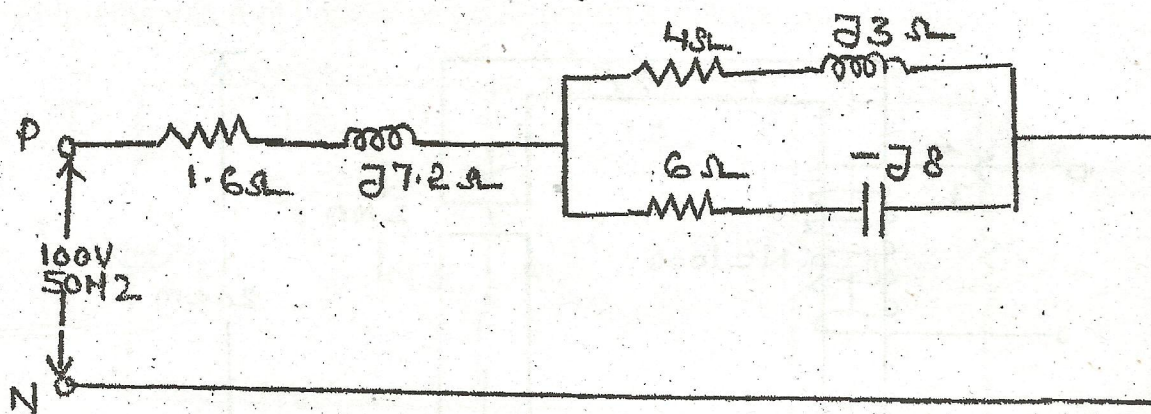
MODULE – III

5. a) A series RLC circuit has $R = 10 \Omega$, $L = 1 \text{ H}$, $C = 20 \mu\text{F}$. A 100 V 50 Hz supply is applied across circuit find the input current and voltage across elements. 7
- b) Draw a Phasor diagram showing following voltages $V_1 = 100 \sin 500t$, $V_2 = 200 \sin (500t + 45^\circ)$, $V_3 = 100 \cos 500t$. Find rms value of resultant voltage. 5
- c) Explain the concept of balanced and unbalanced system. 5
- d) Define (i) phase sequence (ii) apparent power. 3



6. a) Figure shows series-parallel circuit. Find (i) Admittance of each parallel branch (ii) Total circuit Impedance (iii) Supply current and power factor (iv) Total power supplied by source.

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- b) Explain the advantages of three phase system over single phase system.
- c) A 3-phase, 400 V supply is connected to a 3-phase star connected load. The line current is 20 Amps and power consumed by load is 12 KW. Calculate the impedance of load, phase current and power factor.

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MODULE – IV

7. a) Explain how various losses of a transformer can be found out from practical tests without actually loading the transformer.
- b) Explain mutual flux, leakage flux, magnetising reactance and leakage reactance of transformer.
- c) Full scale deflection of moving iron meter is obtained when carrying a current of 100 mA. Show how it can be used to measure voltage upto 150 V and current upto 20 Amps. Given that resistance of instrument is 20 ohms.
8. a) Explain the method for measurement of power in three phase circuit for unbalanced load.
- b) Explain why hysteresis and eddy current loss occur in transformer.
- c) A transformer on no load takes 4.5 Amps at power factor of 0.25 lagging when connected to 230 V, 50 Hz supply. The number of turns of primary wdg. is 250. Calculate (i) magnetising current (ii) core loss (iv) maximum value of flux in core.

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