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F.E. Semester- I (Revised Course 2007-08)  
EXAMINATION Aug/Sept 2019  
Basic Electrical Engineering

[Duration : Three Hours]

[Max. Marks : 100]

Instructions:-

- 1) Answer any five questions with atleast one questions from each module.
- 2) Assume suitable additional data if necessary.

Module –I

- a. State Maximum power transfer theorem. Derive the condition for maximum power transfer. 6
- b. Define Resistance, Inductance and Capacitance from their circuit and Energy viewpoints. 6
- c. In the series –parallel circuit shown in fig (1c), find (i) the voltage drop across  $4\Omega$  resistor and (ii) the supply voltage 8

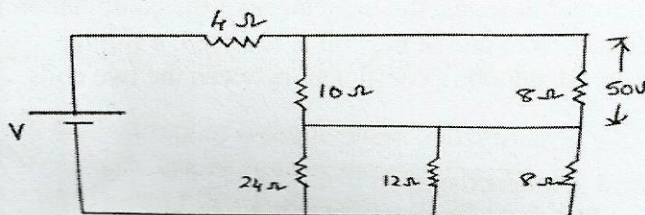
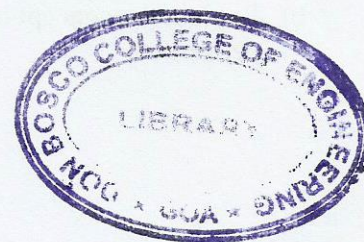
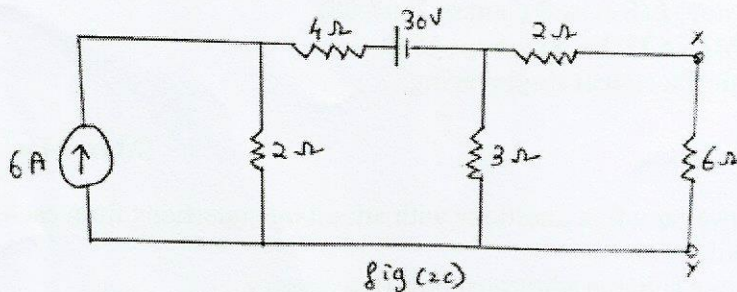


Fig –(1c)

- a. State and explain the following 6
  - i) Kirchhoff's current law
  - ii) Kirchhoff's voltage law
- b. A piece of silver wire has a resistance of  $1\Omega$ . What will be the resistance of manganin wire of one-fourth the length and one-fourth the diameter, if the specific resistance of manganin is 30 times that of silver. 6
- c. Find the Norton's equivalent circuit between the terminals X and Y for the network shown in fig (2c). Also find the current through the  $6\Omega$  resistor 8







### Module - II

- 3
  - a. Derive the expression for dynamically induced EMF. 6
  - b. Explain the magnetic circuit concept 8  
Distinguish between Electric circuit and magnetic circuit.
  - c. When two identical coils are connected in series, the inductance of the combination is found to be 80mH. When the connection to one of the coil is reversed, a similar measurement indicates 20mH. Find the coupling coefficient between the two coils. 6
  
- 4
  - a. Explain the following terms related to magnetism: 6  
 i) Magnetomotive force    ii) Magnetic potential    iii) Reluctance    iv) Permeability  
 v) Flux density    vi) Magnetic field strength
  - b. State, explain and mention the applications of: 8  
 i) Ampere's law    ii) Lenz's law
  - c. A mild steel ring is having a mean circumference of 400mm and cross – sectional area of  $500\text{mm}^2$ . It is uniformly wound with a coil of 100 turns around it. The relative permeability is 380. Calculate : i) reluctance of the ring    ii) The current required to produce a flux of  $800\text{ }\mu\text{wb}$  in the ring. 6

### MODULE –III

- 5
  - a) Derive the expression for instantaneous current and instantaneous power in an AC circuit containing inductance only. Draw neat and labeled waveforms and phasor diagram. 8
  - b) Explain the concept of phasors. Show how phasor additions and subtractions are performed. 6



- 6 c) Three coils each of resistance  $4\Omega$  and inductive reactance  $3\Omega$  are connected in delta across 400V, 50Hz supply. Find current in each coil, line current, active power and reactive power 6
- 6 a. Define the following terms as related to ac quantities. 6  
 i) Cycle ii) Average value iii) Peak factor iv) Frequency v) Reactive power  
 vi) Power factor
- b. In a star connected, three phase system, derive the relationship between line voltage and phase voltage, line current and phase current and the expression for total power consumed. 8
- c. A series R-L circuit having a resistance of  $7\Omega$  and an inductance of  $31.8\text{mH}$  is connected to 230V, 50Hz supply. Calculate : i) The circuit current ii) phase angle iii) power factor iv) power consumed 6

#### MODULE- IV

- 7 a) Describe, with the help of a neat sketch, the construction and principle of operation of Repulsion type moving iron instrument. 10
- b) Explain the working of a single phase ideal transformer. Compare the construction of Core type and Shell type single phase transformers. 10
- 8 a. Explain the two wattmeter method of power measurement in a 3-phase ac circuit. 6
- b. The no load current of a single phase transformer is 5A at 0.25 power factor when supplied at 230V, 50Hz. The number of turns on the primary winding is 200. Calculate : i) the maximum value of flux in the core ii) the core loss iii) the magnetising component of current 6
- c. Write short notes on 8  
 i) Advantages and disadvantages of PMMC type instruments  
 ii) Losses in a single phase transformer