

Total No. of Printed Pages:3

F.E. Semester-I (Revised Course 2007-2008)
EXAMINATION Nov/Dec 2019
Basic Electrical Engineering

[Duration : Three Hours]

[Total Marks : 100]

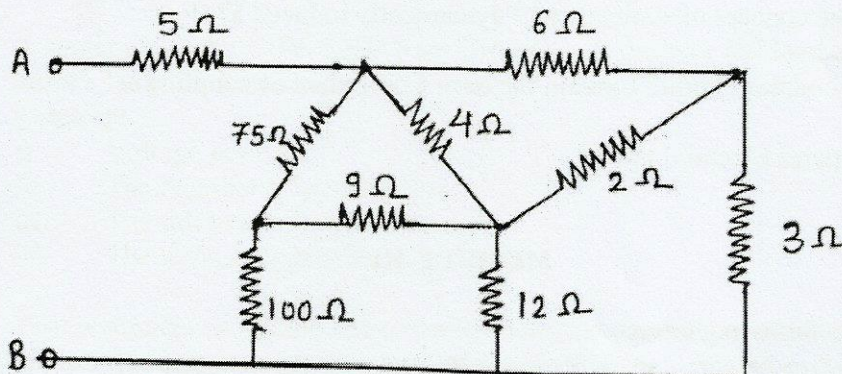
Instructions:

- 1) Answer **any 5** questions in full, with **at least one** questions each Module.
- 2) Missing data, if any may be suitably assumed.

MODULE- I

Q.1

- a) State and explain Norton's theorem. 6
- b) Define the following circuit elements from geometrical viewpoint 6
 - i) Resistance ii) Inductance iii) Capacitance
- c) Find the equivalent resistance between points A and B shown in figure 1 8



Q.2

- a) State and prove maximum power transfer theorem. 6
- b) Find the equivalent resistance when three resistance are connected in 8
 - i) Series ii) Parallel
- c) Derive the equation for equivalent Capacitance where four capacitors are connected in series and parallel. 6



MODULE-II

- Q.3**
- a) Explain the following
 - i) Faradays law
 - ii) Lenz's Law
 - iii) Flemings left hand rule
 - b) Distinguish between self induced emf and mutually induced emf.
 - c) An iron core has a mean cross sectional area of 0.005m^2 and a mean circumference of 0.2m . The iron core has a relative permeability of 20,000 it is wrapped with 300 turns carrying 0.5A of current.
 - i) What is the reluctance of the core?
 - ii) What is the inductance of the coil?
 - iii) What is the magnetic field intensity?
 - iv) What is the magnetic flux density?
- Q.4**
- a) Derive an expression for energy stored in a magnetic circuit.
 - b) Explain the concept of statically and dynamically induced EMF.
 - c) What are coupled circuit? Explain the term Coefficient of coupling
 - d) State Amperes Circuital law.

MODULE-III

- Q.5**
- a) Define the following terms
 - i) Active power
 - ii) Reactive Power
 - iii) Apparent power
 Draw the power triangle to represent above quantities
 - b) A balanced delta load $(8+6j)\Omega$ per phase is supplied from a 3 Phase 440 V source, find the line current, power factor and total power.
 - c) Derive an expression between current and voltage in a pure inductive and in a pure capacitive circuit. Draw the waveform of instantaneous values of voltage, current and power in both the circuits.
- Q.6**
- a) Graphically show the representation of a 3 Phase system and explain the concept of phase sequence.
 - b) Define phase difference. Explain the concept of leading and lagging phase angle.

- c) A sinusoidal source of $e(t) = 170 \sin 377t$ is applied to an RL series circuit. It is found that the circuit absorbs 770W when an effective current of 12 A flows. 10
- i) Find the power factor of the circuit?
 - ii) Calculate the value of impedance?
 - iii) Calculate the inductance of the circuit?
 - iv) Find the frequency of the sinusoidal source?

MODULE-IV

- Q.7**
- a) Write short note on open circuit and short circuit test on a single phase transformer. 6
 - b) With the help of neat diagram explain the working principle of a dynamometer type of instruments. 7
 - c) Explain the concept of measurement of power in three phase circuit using two wattmeter method 7
- Q.8**
- a) Explain the working principle of single phase transformer. 7
 - b) A single phase 230/20V, 50Hz transformer has secondary full load current of 180A it has 45 Turns on its secondary
Calculate 6
 - i) Voltage per turn
 - ii) The Number of primary turns
 - iii) The full load primary current
 - iv) The KVA output of the transformer
 - c) Two wattmeter are connected to measure the input to a three phase , 8.8KW, 50 Hz induction motor which works at a fully load efficiency of 85% and a power factor of 0.8. Find the reading of the two wattmeter. 7