FE114

Total No. of Printed Pages: 3

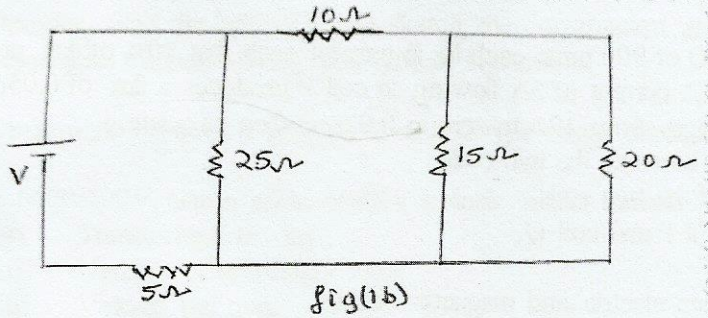
F.E. Semester-I (Revised Course 2007-2008)
EXAMINATION MAY/JUNE 2019
Basic Electrical Engineering

[Duration : 3 Hours] **[Max. Marks : 100]**

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

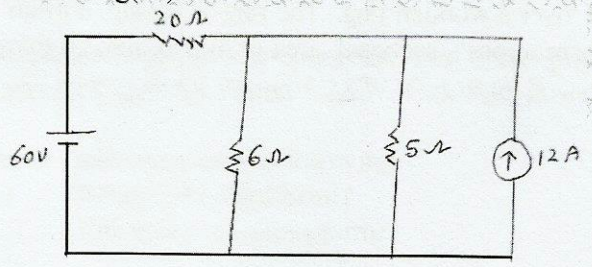
Module - I

1. a. State and explain Thevenin's theorem. **(6)**
   b. In the circuit shown in fig (1b), find the value of supply voltage V, so that the 20Ω resistor can dissipate 180W of power. **(6)**



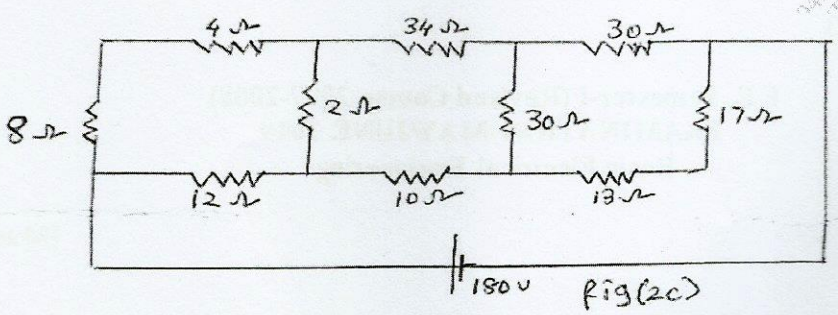
fig(1b)

   c. Using Norton's theorem, calculate the current flowing through the 6Ω resistor in the circuit shown in fig(1c) **(8)**



fig(1c)

2. a. State and explain Kirchhoff's current law and Kirchhoff's voltage law. **(6)**
   b. Define Resistance, inductance and Capacitance from their Circuit and Geometrical viewpoints. **(6)**
   c. Find the current in the 10 Ω resistor in the given network shown in fig.(2c). **(8)**



fig(2c)

Module – II

3. a. Explain the concept of mutually induced emf and self-induced emf. **(7)**

   b. Derive expression for Force between two current carrying conductors. Comment on the direction of Force with respect to the direction of current in the conductors. **(6)**

   c. Two identical coils P and Q of 900 turns each lie in parallel such that 70% of flux produced by one coil links to the other. A current of 5A flowing in coil P produces a flux of 0.05mwb in it. If the current in coil P changes from 12A to zero in 0.02sec, then calculate: **(7)**
      i) Mutual inductance between the two coils
      ii) Self-inductances of the two coils.
      iii) EMF induced in coil P and coil Q.

4. a. Discuss the analogy between electric and magnetic circuits. **(7)**

   b. Derive an expression for energy stored in magnetic circuit. **(6)**

   c. A coil 120 turns is uniformly wound over a wooden ring. The ring is having a mean circumference of 400mm and a uniform cross – sectional area of 400sq. mm. A current of 5A is passed through the coil. **(7)**
      Calculate:
      (i) Magnetic field strength H
      (ii) The flux density B
      (iii) The total fluxΦ.

Module – III

5. a. Derive the expression for instantaneous current and instantaneous power in an AC circuit containing Resistance only. Draw neat and labeled waveforms and phasor diagram. **(8)**

   b. A balanced star connected load of (8+j6) Ω is connected across three phase, 50Hz, 440V supply system. Calculate the line current, power absorbed and reactive volt – amperes. **(6)**

   c. With a neat sketch explain how an alternating voltage is produced, when a coil is rotated in a magnetic field. Derive the expression for the instantaneous value of alternating sinusoidal emf. **(6)**

6. a. Define the following terms as related to ac quantities: **(6)**
   (i) Waveform
   (ii) RMS value
   (iii) Form factor
   (iv) Frequency
   (v) Active power
   (vi) Power factor

   b. In a Delta connected, three phase system, derive relationship between line voltage and phase voltage, line current and phase current and the expression for total power consumed. **(8)**

   c. A coil dissipates 10W at 0.1 power factor lagging when connected to a 240V, 50Hz ac supply. Calculate the resistance, impedance and inductance of the coil. **(6)**

Module – IV

7. a. Describe, with the help of a neat sketch, the construction and principle of operation of permanent magnet moving coil type of instrument. **(10)**

   b. Distinguish between Core type and shell type single phase transformers. **(5)**

   c. A 6600/400V, single phase 600KVA single phase transformer has 1200 primary turns. Find **(5)**
   (i) Transformation ratio,
   (ii) Number of secondary turns
   (iii) Voltage per turn,
   (iv) Secondary current when it supplies a load of 400KW at 0.8 power factor lagging.

8. a. Derive the EMF equation of a single phase transformer. Mention the assumptions made. **(6)**

   b. A balance 3-phase, star-connected load draws power from 440V supply. The two wattmeter's connected read 5KW and 1.2KW. Calculate power, power factor and current in circuit. **(6)**

   c. Write short notes on the following: **(8)**
   (i) Rating of a transformer
   (ii) Efficiency of a transformer