

Level: Bachelor  
 Programme: BE  
 Course: Basic Electrical Engineering

Semester: Fall

Year : 2013  
 Full Marks: 100  
 Pass Marks: 45  
 Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

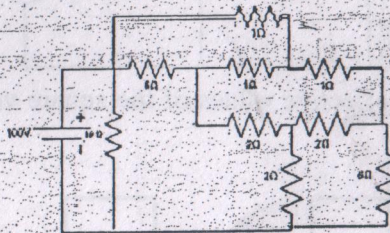
*Attempt all the questions.*

1. a) Explain in brief about generation, transmission and distribution of electrical power. 7

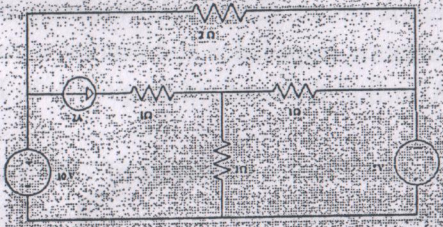
OR

Explain the construction and operation of single phase energy meter.

- b) Define active and passive elements. Find the equivalent resistance of the given network seen from the source. 8

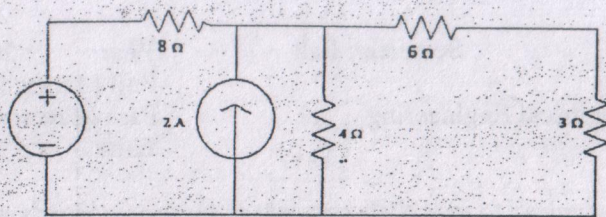


2. a) By using Supermesh concept calculate voltage across  $2\Omega$  resistor of the circuit shown below. 7



- b) State Thevenin's theorem and use it to calculate power consumed by  $3\Omega$  resistor for the circuit shown below. 8

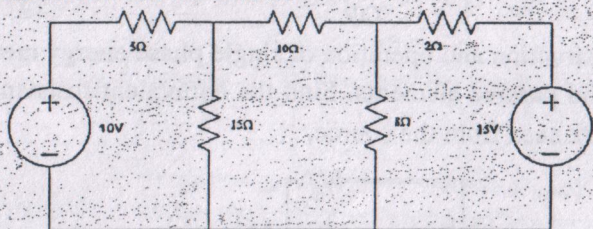




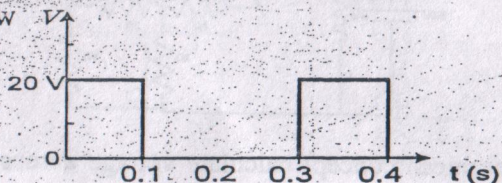
OR

State maximum power transfer theorem. Prove that the maximum power transferred to the load is  $V_{th}^2/4R_{th}$ .

- a) Use superposition theorem to calculate the current through  $10\Omega$  resistor of the circuit shown below. 8



- b) Compute the average and effective values of the square voltage wave shown in figure below 7



- a) Define resonance in electric circuit. Explain the variation of inductive reactance, capacitive reactance, impedance and current with frequency in RLC series circuit. Also find the resonant frequency in RLC series circuit. 8
- b) A coil of resistance  $40\Omega$  and inductive reactance of  $25\Omega$  is connected in series to 220V, 50Hz supply. Calculate. 7
- Active and reactive components
  - Total power of the circuit.
- a) A three phase balanced load connected in star draws a total power of 20KW at 0.8 pf lag when connected to 3 $\phi$ , 400V, 50Hz supply. 7

Calculate

- Resistance of coil
- Inductance of coil

OR

The star-connected stator of a three-phase, 50Hz alternator supplies a balanced delta-connected load. Each phase of the load consists of a coil of resistance 15 ohm and inductance 36mH, and the phase voltage generated by the alternator is 231V. Calculate a) the phase and line currents b) the load power factor c) the power delivered to the load.

- b) A 240V shunt motor runs at 1450 rpm at full load with an armature current of 11 A. The total resistance of armature and brush is  $0.6\Omega$ . If the speed is to be reduced to 1000rpm with the same armature current, calculate the value of resistance to be connected in series with the armature. 8
6. a) A 50KVA, 500/250V transformer has a primary winding resistance of  $0.5\Omega$  and leakage reactance of  $0.7\Omega$ . The secondary winding resistance is  $0.8\Omega$  and leakage reactance of  $0.9\Omega$ . Calculate the equivalent resistance, reactance and impedance of transformer referred to 8
- Primary
  - Secondary
- b) Explain the construction and operating principle of 3 $\phi$  induction motor. 7

OR

Explain the construction and operation of synchronous motor.

7. Write short notes on: (Any two) 2 $\times$ 5

- Advantages of 3 $\phi$  system
- Magnetic circuit analogy with electric circuit.
- Power factor and its significance.