

# Solved Paper 2009

## Electrical Engineering (Paper II)

1. (a) State Norton's theorem. (5)
- (b) A coil of insulated wire of 500 turns and resistance of  $4\ \Omega$  is closely wound on an iron ring. The ring has a mean diameter of 0.25 m and a uniform cross-sectional area of  $700\ \text{mm}^2$ . Calculate the total flux in the ring when a DC supply of 6V is applied to the ends of the winding. Assume relative permeability of iron is 500. (15)
- (c) Determine the current  $I$  in the network shown in fig. by Thevenin's theorem. (10)

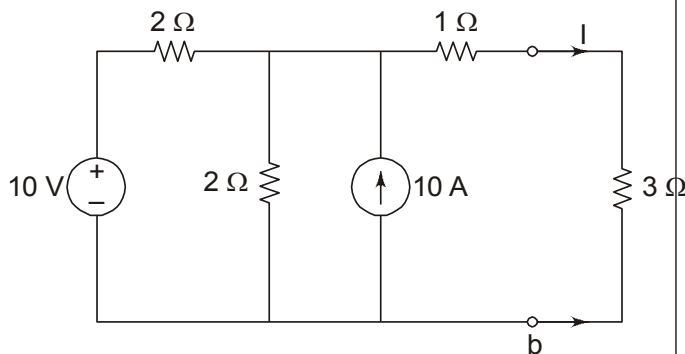


Fig.

2. (a) A coil of resistance  $10\ \Omega$  and inductance  $0.02\ \text{H}$  is connected in series with another coil of resistance  $6\ \Omega$  and inductance  $15\ \text{mH}$  across a  $230\ \text{V}$ ,  $50\ \text{Hz}$  supply. Calculate
  - (i) Impedance of circuit
  - (ii) Voltage drop across each coil
  - (iii) Total power consumed by the circuit (15)
- (b) Describe with the aid of a carefully labelled diagram, the construction and working of electrodynamic type wattmeter. (10)
- (c) Explain the working of single phase bridge rectifier. (5)
3. (a) Explain the tests to be performed on a transformer to determine the equivalent circuit parameters of transformer. (15)
- (b) A  $250\ \text{V}$  DC shunt motor having an armature resistance of  $0.25\ \Omega$  carries an armature current of  $50\ \text{A}$  and runs at  $750\ \text{rpm}$ . If the flux is reduced by  $10\%$ , find the speed. Assume that the load torque remains same. (15)
4. (a) A 3-phase star connected alternator is rated at  $1600\ \text{kVA}$ ,  $13500\ \text{V}$ . The effective armature resistance and synchronous reactance are  $1.5\ \Omega$  and  $30\ \Omega$  respectively per phase. Calculate the percentage regulation for a load of  $1280\ \text{kW}$  at power factor of
  - (i)  $0.8$  leading
  - (ii) unity. (15)
- (b) Describe with diagrams the working of the following induction motor starters: (15)
  - (i) Direct on-line starter
  - (ii) Autotransformer starter
  - (iii) Star-delta starter
5. (a) Define power factor and explain why in general, it should be kept as high as possible in power supply systems. Show with phasor diagram. How the power factor of load can be improved by connecting a capacitor in parallel with it. (15)
- (b) With the help of labelled diagram explain the working of thermal power plant (15)
6. (a) Describe distance protection scheme for the protection of feeders. (10)
- (b) Discuss the advantages of high voltage transmission. (10)
- (c) Discuss the advantages of electric heating. Explain the principle of dielectric heating. (10)