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COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2008

ME 04 108—BASIC ELECTRICAL ENGINEERING

(2004 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

I. (a) Define and explain the following :—

(i) Permeability

(ii) Reluctance.

(b) Explain about eddy current losses in ferromagnetic materials.

(c) Explain what is meant by reactive and apparent power.

(d) A series RLC circuit has R = 5 Ω, L = 40 mH and C = 1 μF. Calculate the Q-factor of the circuit.

(e) Explain the construction of core-type transformer.

(f) Derive the emf equation of a transformer.

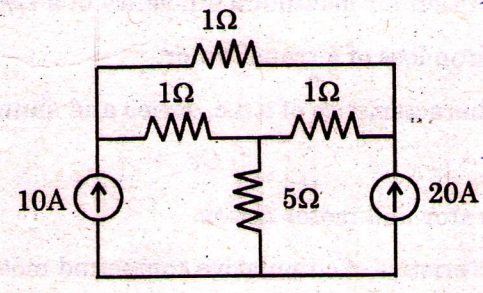
(g) A 440 V shunt motor has an armature resistance of 0.8 Ω and a field resistance of 200 Ω. Determine the back emf when giving an output of 7.46 kW at 85% efficiency.

(h) Explain what is meant by separately excited generator.

(8 × 5 = 40 marks)

Part B

II. (a) (i) Find the current in the 5 Ω resistor of the following circuit using super position theorem.



(9 marks)

(ii) Compare electric and magnetic circuits. (6 marks)

Or

(b) Write short note on :

(i) Deflecting torque.

(ii) Controlling torque.

(iii) Damping torque.

(3 × 5 = 15 marks)

III. (a) (i) A 200 volts 50 Hz source supplies a series RC circuit with R = 30 Ω and C = 79 μ F. Find the impedance, current power and power factor.

(8 marks)

(ii) Explain frequency variation in RLC series circuit. (7 marks)

Or

(b) (i) Two wattmeters are connected to measure the power in a 3-phase, 3-wire balanced load. Determine the total power and power factor if the two wattmeters read :

1 1000 W each both positive.

2 1000 W each of opposite sign.

(7 marks)

(ii) Each phase of a 3-phase alternator produces a voltage of 6351 volts and carry a maximum current of 315 amperes. Find the line voltage, maximum line current and total kVA capacity of the alternator if it is star connected.

(8 marks)

IV. (a) (i) The no-load ratio of a 50 Hz single phase transformer is 6000/250 V. Estimate the number of turns in each winding if the maximum flux is 0.06 wb in the core.

(6 marks)

(ii) Explain about transformer with magnetic leakage. (9 marks)

Or

(b) (i) Explain efficiency of a transformer. (4 marks)

(ii) Derive the condition for maximum efficiency of a transformer. (6 marks)

(iii) Discuss about iron loss of a transformer. (5 marks)

V. (a) Explain the load characteristics of a d.c. series and shunt generators. (15 marks)

Or

(b) (i) Compare generator and motor action. (7 marks)

(ii) Explain characteristics of cumulative compound motors. (8 marks)

[4 × 15 = 60 marks]