YMCA UNIVERSITY OF SCIENCE AND TECHNOLOGY, FARIDABAD

B.Tech 1st Semester Examination

Electrical Technology

Paper   E-105

Time:- Three Hours   Maximum Marks:-60

Note:- (i) Question no.1 is compulsory from Part-I.

(ii) Attempt any four questions from Part-II.

PART-I – (2x10 = 20 Marks)

Q.1.a) Explain the terms amplitude, cycle, time period and phase difference.   (2)

b) Define the terms: active power, reactive power, apparent power.   (2)

c) The equation of an alternating current is i = 42.42 sin 628t. Determine; its maximum (2)
value; frequency; RMS value; average value and form factor.

d) What is the significance of j-operator?   (2)

e) State Norton's theorem.   (2)

f) What are the similarities between magnetic circuit and electrical circuit?   (2)

g) What are the causes of low power factor?   (2)

h) What are eddy currents?   (2)

i) What is the function of commutator in a dc machine?   (2)

j) Compare star-connection and delta-connection with reference to a three phase   (2)
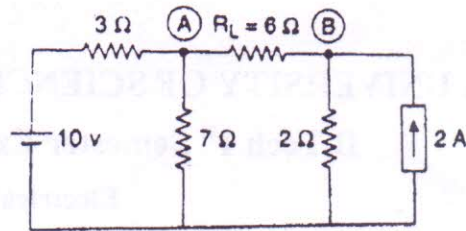system.

PART-II – (4x10 = 40 Marks)

Q.2.a) Determine currents in each branch in a given network using mesh analysis.   (5)
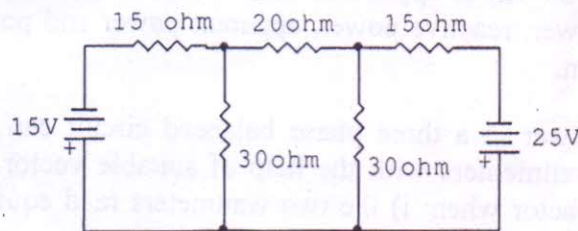
b) For a given waveform, determine: frequency of waveform; wave equation for   (5)
0<t<100 m sec; rms value; average value and form factor.
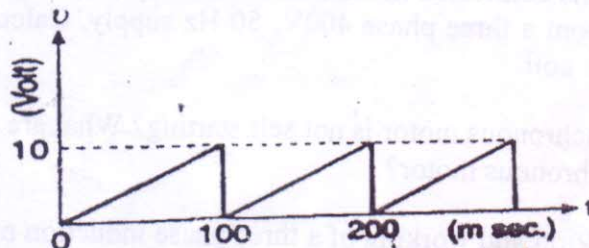
Q.3.a) In the given circuit, find the power delivered to the 6 ohm resistor by using Thevenin's theorem. (5)

b) A sinusoidal a.c. voltage applied to a single phase circuit at t=0 has rms values of 200V, frequency 50 Hz, and instantaneous value of $200\sqrt{2}$ V. The current is 5A and has a 0.5 lag p.f. Write (i) expression for instantaneous value of voltage, and current; (ii) value of circuit parameter in ohm, and impedance in complex number form, and (iii) value of instantaneous voltage and current at t=0.0125 s. (5)

Q.4.a) A steel ring has mean diameter of 20 cm, a cross-section area of 25 cm^2 and a radial air-gap 0.8 mm cut across it. When exited by a current of 1A through a coil of 1000 turns wound on the ring core, it produced an air gap flux of 1mWb. Neglecting leakage and fringing calculate: the relative permeability of steel and the total reluctance of the magnetic circuit. (5)

b) What is resonance? What are the properties of the circuit when it is in resonance? Derive the condition for resonance in a series RLC circuit and draw a phasor diagram. (5)

Q.5.a) Explain as to what you understand by (i) static, (ii) dynamic inducement of electromotive force. Illustrate by the help of simple sketches. (5)

b) A coil having resistance of 5 ohm and an inductance of 0.02 H is arranged in parallel with another coil having resistance of 1 ohm and inductance of 0.08 H. When a supply of 100V, 50 Hz is applied to the circuit, determine: branch current, total current, active power, reactive power, apparent power and power factor. Also draw the phasor diagram. (5)

Q.6.a) Prove that the power in a three phase balanced circuit can be deduced from the reading of two wattmenters with the help of suitable vector diagram. Discuss the nature of power factor when: i) the two wattmeters read equal and opposite values and, (ii) the one wattmeter reads zero. (5)

b) Three similar coils connected in star, takes a total power of 1.5kW at a power factor of 0.2 lagging from a three phase 400V, 50 Hz supply. Calculate the resistance and inductance of the coil. (5)

Q.7.a) Explain why synchronous motor is not self starting? What are the starting methods of three phase synchronous motor? (5)

b) Explain construction and working of a three phase induction motor. (5)

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