A coil is connected in series with a non-inductive resistance of 30Ω a cross 240V, 50Hz supply. The reading of a voltmeter a cross the coil is 180 V and across the resistance is 130 V. Calculate

(i) Power consumed by coil

(ii) Power factor of whole circuit (2+8=10)

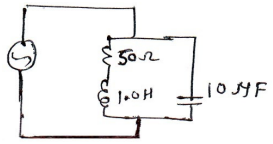
(b) Compare a series resonance with parallel resonance: (4+6=10)
For the circuit given below, determine

(i) Resonant frequency

(ii) Total impedance of circuit at resonance

(iii) Band width

(iv) Quality factor



Q-7. (a) Compare an a.c. system with d.c. system. A balanced 3 phase star connected load of 240 kW takes a leading current of 170 amperes, when connected across a 3 phase 2200 volts, 50 Hz supply. Obtain the values of the resistance, impedance and capacitance of the load per phase and also calculate the power factor of the load. (3+7=10)

(b) Draw the phasor diagram of line currents and phase currents in a mesh connected 3 phase system. Three similar resistance connected in star draw a line current of 10 A from a 400V, 3 phase mains. To what value should the line voltage be changed to obtain the same line current with the resistances connected in delta? (4+6=10)

Q-8. (a) Define all day efficiency of a transformer.

In a 100 KVA, 1 phase 6600/230V transformer, the iron losses and full load copper losses were found to be as 1000 watts and 1300 watts respectively. Calculate efficiency at half load and 0.6 power factor. Determine maximum efficiency and corresponding load. (1+4=5)

(b) The primary and secondary windings of a 80 KVA, 13.2 KV / 250V single phase transformer have resistances of 20Ω and 0.04Ω respectively. The total leakage reactance is 70Ω as referred to the primary winding. Find full load regulation at a power factor of 0.8 lagging. (5)

(c) Write short notes on following: (5x2=10)

(i) Construction of a single phase transformer.

(ii) Phasor diagram of a transformer for an inductive load.

Roll No. ……..

Lingaya's University, Faridabad
B.Tech. 1st Year (Term – I)
Examination – October, 2010
Electrical Engineering (EL-101)

Time: 3 Hours **Max. Marks: 100**

Before answering the question, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note: *All questions carry equal marks. Attempt five questions. Question 1 is compulsory. Select two questions from Section B & two from Section C.*

SECTION – A

Q-1. Part-A

Select the correct answer of the following multiple choice questions. (1x10=10)

(i) KVL states that in a closed circuit of an electric network:

(a) ΣE=0 (b) Σ I=0 (c) Σ v=0 (d) ΣE+ ΣV=0

(ii) A network which does not have either voltage source or current source is called:

(a) active network (b) passive network
(c) resistive network (d) dummy network

(iii) If the effective value of the sinusoidal voltage is 111 volts. Its average value will be:

(a) 100 V (b) 123.21 V (c) 156. 51 V (d) none of the above

(iv) Peak factor of an alternating current is given by relation

(a) I_{rms} / I_{avg}. (b) I_m / I_{rms} (c) I_{avg} / I_{rms} (d) I_{rms} / I_m

(v) In a balanced three phase, star connected system, the relation between phase voltage V_{ph} and line V_L is :

(a) $V_{ph} = \sqrt{3}\, V_L$ (b) $V_{ph} = 0.577\ V_L$ (c) $V_{ph} = \frac{V_L}{\sqrt{2}}$ (d) none of these

(vi) A 3 phase load is said to be a balanced load, if all the three phases have the same:

(a) impedance (b) power factor (c) both a and b (d) none of above

(vii) MMF is analogous to:

(a) electric current in electric circuit (b) current density in conductor
(c) electromotive force (d) voltage

(viii) If the supply frequency to the transformer is increased the iron loss:

(a) increased not change (b) will be zero (c) will increase (d) will decrease

(ix) Synchronous speed of a synchronous machine is given as:

(a) Ns = 120 f | p (b) Ns = 120 p|f (c) Ns = 120 | fp (d) Ns = 1200 | fp

(x) Which of following electrical machine has the highest efficiency:

(a) d.c. generator (b) a. c. generator (c) Transformer (d) induction motor.

Part-B

(a) State Kirchhoff's current and voltage laws. Explain with suitable examples. (5)

(b) What do you mean by series or voltage resonance? Explain it with the graphical representation in an R-L-C series circuit (5)

Section – B

Q-2. (a) What are the similarities and dissimilarities in magnetic and electric circuit? (6)

(b) Define the following terms: (1+5=6)

(i) Reluctance (ii) permeance (iii) MMF
(iv) permeability (v) magnetic flux density (vi) magnetic circuit

(c) What is hysteresis loss? Explain B-H curve and how magnetic calculations from B-H curve are done. State the importance of hysteresis loop. Draw the hysteresis loop for hard steel, silicon steel and wrought iron. (8)

Q-3. (a) What is the significance of back emf in d.c. machines. Derive the expression for it? (2+4=6)

(b) What is function of commutatar in a d.c. motor? How d.c. motors are classified? Draw the diagram with required equations of induced emf for every case. (1+5=6)

(c) Write short notes on:

(i) Constructional features of a d.c. machine

(ii) principle of operation of a 3 phase induction motor. (4x2=8)

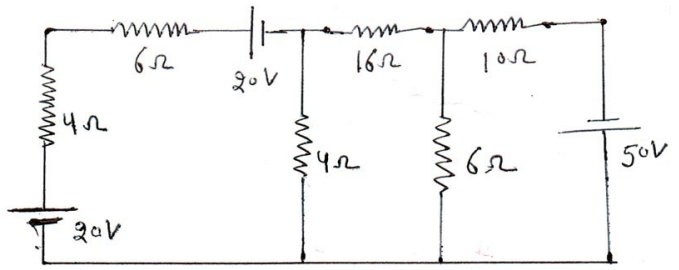
Q-4. (a) Differentiate between recording and integrating type of instruments. Give two examples of each of these instruments. (4)

(b) Explain principle & working of single phase induction type energy meter. (8)

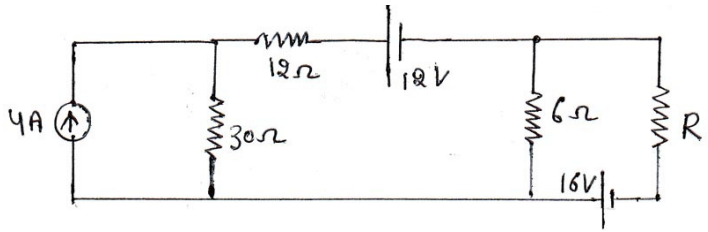
(c) Explain in brief the working principle of permanent magnet moving coil instrument. Why is the scale linear? (8)

Section- C

Q-5. (a) Define conductance and conductivity of the conductor material. Using nodal analysis method find the current through 16 Ω resistor in the circuit given below: (2+8=10)



(b) What is maximum power transfer theorem? Where this theorem is used? Find the value of resistance R to have maximum power transfer in the circuit given below. Also obtain the amount of maximum power. (4+6=10)



Q-6. (a) What do you understand by phase lag and phase lead? Explain with the help of example.