Code: 13A02101 **R13**

B.Tech I Year (R13) Supplementary Examinations December/January 2014/2015

ELECTRICAL CIRCUITS

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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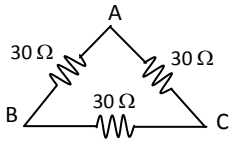
1 Answer the following: (10 X 02 = 20 Marks)

(a) Transform the circuit shown below to delta-star transformation:



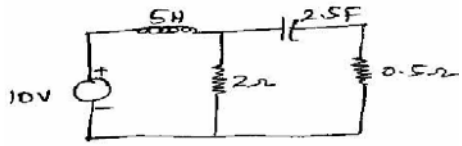
(b) Two inductively coupled coils have self inductances L_1 = 50 mH and L_2 = 200 mH. If the coefficient of coupling is 0.5, compute the value of mutual inductance between the coils.

(c) Determine the power factor of a RLC series circuit R = 5 Ω, X_L= 8 Ω and X_C = 12 Ω.

(d) In a three-phase balanced delta system, the voltage across R and Y is $400\angle 0^0$ V. What will be the voltage across Y and B? Assume RYB phase sequence.

(e) When the circuit is said to be under resonance?

(f) Draw the dual network for the circuit shown below:



(g) State reciprocity theorem.

(h) Write down general equations for hybrid parameters.

(i) Define the term 'Time constant' of a circuit, in general.

(j) Write the any two property of Fourier transform.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) State and explain the Kirchhoff's Laws.

(b) A coil consists of 750 turns and a current of 10 A in the coil gives rise to a magnetic flux of 1200 μWb. Calculate the inductance of the coil and determine the average emf induced in the coil when the current is reversed in 0.1 sec.

OR

3 (a) State and explain Faraday's laws of electromagnetic induction.

he number of turns in a coil is 250. When a current of 2 A flows in the coil, the flux in the coil is 0.3 mWb. When the current is reduced to zero in 2 ms, the voltage induced in a coil lying in the vicinity of the coil is 63.75 V. If the co-efficient of coupling between the coils is 0.75, find: (i) The self inductance of the two coils. (ii) Mutual inductance. (iii) Number of turns in the second coil. (iv) Derive the formulae used.

UNIT – II

4 (a) Derive the relation between phase and line values in a 3-phase balanced star connected system with neat circuit diagram.

(b) An unbalanced four wire, star connected load has a balanced voltage of 400 V, the loads are: Z_1= (4+j16) Ω, Z_2 = (5+j20) Ω, Z_3 = (8+j4) Ω. Calculate the: (i) The line currents. (ii) Current in the neutral wire and (iii) The total power.

OR

5 (a) Explain how power is measured in three phase star connected system using two wattmeter method with neat circuit diagram.

(b) An unbalanced four wire, star connected load has a balanced voltage of 400 V, the load are; Z_1= (4+j8) Ω, Z_2 = (15+j20) Ω, Z_3 = (3+j4) Ω. Calculate the: (i) The line currents. (ii) Current in the neutral wire and (iii) The total power.

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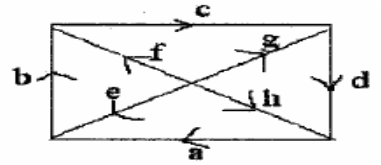
UNIT – III

6 (a) Write short notes on nodal analysis. By taking any one example explain the significance of nodal analysis.

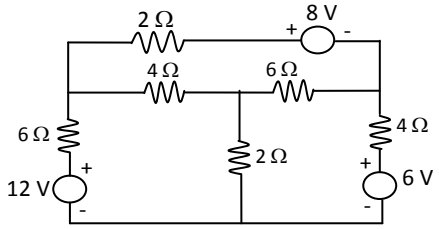
(b) A capacitor C is in series with a 75 Ω resistor and a 12 H coil across a 220 V, 60 Hz supply. Determine the value of 'C' that resonates the circuit.

OR

7 (a) Write the tie-set schedule and write tie-set matrices also. Write the relationship between the branch current and link currents of the given figure below.



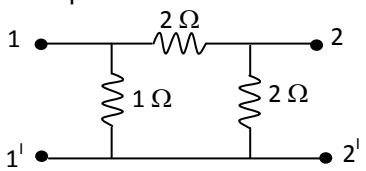
(b) Find the cut-set matrix of the network as shown in figure and obtain relationship between the branch current and voltages.



UNIT – IV

8 (a) State and explain the maximum power transform theorem.

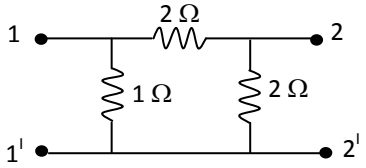
(b) Find the transmission parameters for the resistance network shown in figure below.



OR

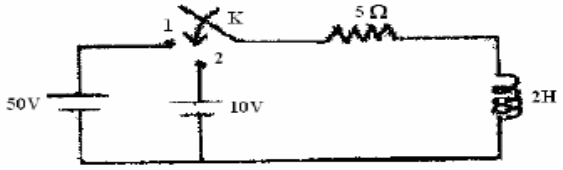
9 (a) State Millmann's theorem and Tellegon's Theorem.

b) (Find the Z and transmission parameters for the resistance network shown in figure below.



UNIT – V

10 In the circuit shown in figure, the switch S is in position 1 for a long time and brought the position 2 at time t=0. Determine circuit current.



OR

11 (a) A series RLC circuit has R = 50 Ω, L = 0.2H and C = 50 μF constant voltage of 100 V is impressed upon the circuit at t = 0. Find the expression for the transient cuurent assuming initially relaxed conditions.

(b) Explain the properties of Fourier transforms in detail.

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