Code: 13A02101

SS

B.Tech II Year I Semester (R13) Regular Examinations December 2014

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) Define unilateral and bilateral elements.

(b) State Kirchoff's Laws.

(c) Define RMS value and Average value of an alternating quantity.

(d) What is the significance of 'j' notation?

(e) A circuit as the resonant frequency of 60 Hz and lower half power frequency of 40 Hz. What is its bandwidth?

(f) Define branch and tree of a planar network.

(g) The Z-parameters of a circuit are given by $\begin{bmatrix} 4 & 1 \\ 3 & 3 \end{bmatrix}$. Obtain the transmission parameters.

(h) State Tellegen's theorem.

(i) State the advantages of Laplace transform application to the solution of electric circuits.

(j) Give the expressions for even and odd function symmetry in Fourier series.

PART – B

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

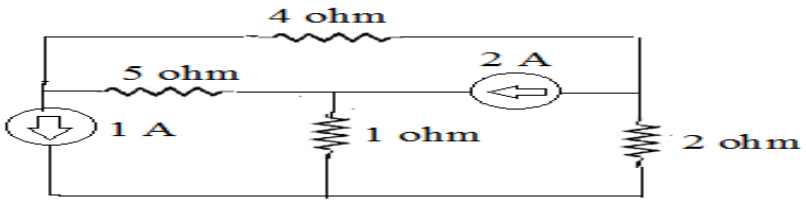
UNIT - I

2 (a) Distinguish between statically induced e.m.f. and dynamically induced e.m.f

(b) Two coupled coils have self inductances L_1 = 10 mH and L_2 = 20 mH. The coefficient of coupling is 0.75. Find the voltage in the coil and flux of the first coil provided the second coil has 500 turns and the circuit current is given by i_1 = 2 sin 314t amperes.

OR

3 Find the current and voltage drops through 5 Ω resistor using nodal analysis in the circuit given below.



UNIT - II

4 (a) Derive the expressions for wattmeter readings in two watt meter method with balanced star connected load. How do you calculate the power factor of the balanced load from wattmeter readings?

(b) The power factor of a three-phase, 440 V motor load is 0.8. During power measurement by the two wattmeter method, the input is 25 kW. Calculate the reading on each wattmeter.

OR

5 (a) Show that the average power in a purely inductive circuit is zero.

(b) A coil has a reactance of 25 ohm and an inductance of 1 Henry. Determine the inductance of the coil. If an A.C. voltage of 200 V (rms), 50 Hz is applied across the coil, find the input current, power factor, real power and reactive power flow in the coil.

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UNIT - III

6 (a) With suitable example, explain the procedure for obtaining fundamental tie-set matrix.

(b) A series RLC circuit has R = 2 Ω, L = 2.0 mH, C = 10 μF. Calculate the Q factor of the circuit, bandwidth, resonant frequency and the half power frequency f_1 and f_2.

OR

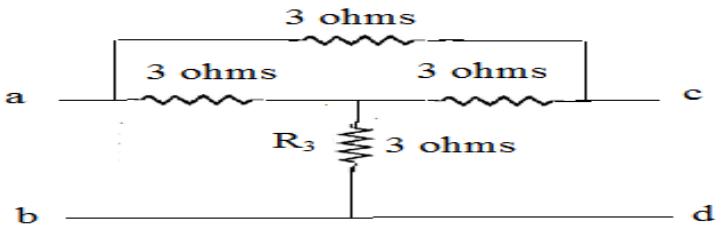
7 Draw the oriented network graph from the incidence matrix given below.

Nodes	Branches					
	1	2	3	4	5	6
A	-1	0	0	+1	-1	0
B	+1	-1	0	0	0	-1
C	0	+1	-1	0	+1	0
D	0	0	+1	-1	0	+1

UNIT – IV

8 (a) Define hybrid parameters of a two port network. Establish the relation between hybrid parameters and ABCD parameters.

(b) Determine the Y- parameters for the bridge T network shown below.



OR

9 (a) The voltages at the two ports of a two-port network are represented as $V_1 = 5I_1 + 5I_2$, $V_2 = I_1 + 2I_2$. If load impedance of $3 \angle 0^0$ ohm is connected at the output port. Determine the input impedance.

(b) State Thevenin's theorem. Discuss how the Thevenin's voltage and Thevenin's resistance are determined with an example.

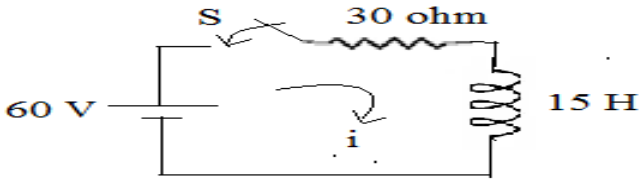
UNIT – V

10 An A.C. voltage of V = Vsin500πt is applied to a series R-L circuit. If the L-R circuit has R = 10 Ω and L = 0.1H, calculate the ratio of maximum value to which the current rise to the steady state maximum value when the voltage is applied at an instant t = 0.002 sec.

OR

11 (a) Derive the expression for i(t) of a RL series circuit when D.C. voltage is applied to it at t = 0 by closing the switch. Define the time constant of RL circuit.

(b) A series RL circuit with R = 30 Ω and L = 15H has a constant voltage E = 60 V at t = 0 as shown in below figure. Determine the current I, the voltage across the resistor and the voltage across the inductor.



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