Code: 13A02101

SS

B.Tech II Year I Semester (R13) Supplementary Examinations November/December 2017

ELECTRICAL CIRCUITS

(Electrical & 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) Write the volt-ampere relations of R, L, C parameters.

(b) What are the differences between ideal and practical sources?

(c) Define form factor and peak factor of an alternating quantity.

(d) Draw the impedance triangle of series R-L and R-C circuits.

(e) Define Tie-set and cut-set.

(f) What is duality? What are dual quantities?

(g) State the maximum power transfer theorem.

(h) Write down general equations for hybrid parameters.

(i) Find the Laplace transform of $e^{2t}\sin 5t$

(j) What are the properties of Fourier transforms/

PART – B

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

UNIT – I

2 (a) Obtain the expressions for star-delta and delta-star equivalence of resistive network.

(b) Two resistances when they are in series have an equivalent resistance of 9 ohms and when connected in parallel have an equivalent resistance of 2 ohms. Find the resistances and ratio of voltage and current sharing between the elements if the supply voltage is 50 V.

OR

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

(b) Define: (i) Flux. (ii) m.m.f. (iii) Reluctance. (iv) Magnetic field intensity.

UNIT – II

4 (a) A series RLC circuit with R = 100 Ω, L = 0.5H, C = 40μF has an applied voltage of $100\angle 0^{o}$ with variable frequency. Calculate the resonance frequency, current at resonance and voltage across R, L and C. Also calculate the Q-factor, upper and lower cutoff frequencies.

(b) Prove that pure capacitance when connected across an alternating source draws the current leading over voltage by 90^{0}. Show that power consumed by pure capacitance is zero.

OR

5 A 400 V, three-phase supply feeds an unbalanced three-wire, star-connected load. The branch impedances of the load are $Z_R = (4+j8)\,\Omega$, $Z_Y = (3+j4)\,\Omega$, $Z_Z = (15+j20)\,\Omega$. Find the line currents and voltage across each phase using Millman's method. Assume RYB phase sequence.

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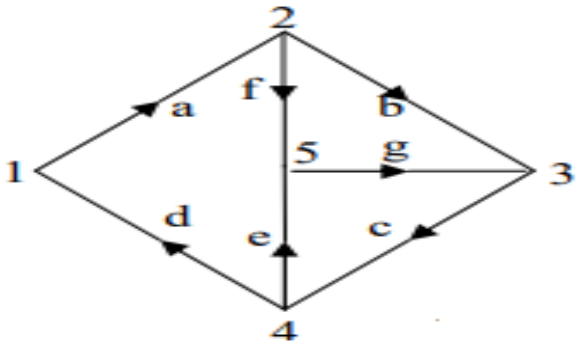
UNIT – III

6 (a) Describe the procedure to construct the dual of a network with an example.

(b) Show that the locus of the current in an R-L circuit with XL variable is a semicircle. Find the radius and the center of the circle.

OR

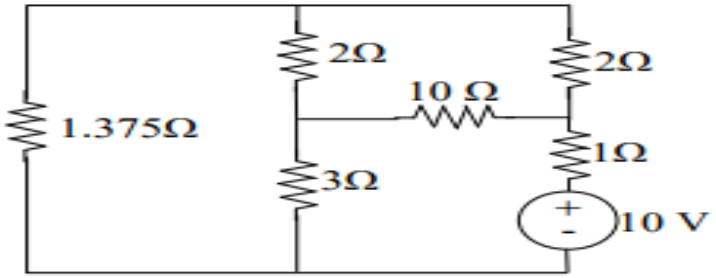
7 (a) Find fundamental tie-set matrix for the graph and its tree shown in figure given below.



(b) Explain the procedure to draw the locus diagram of R-C series circuit when 'C' is varying.

UNIT – IV

8 For the network shown in figure below, find the current through 1.375 ohms resistor and hence verify reciprocity theorem.



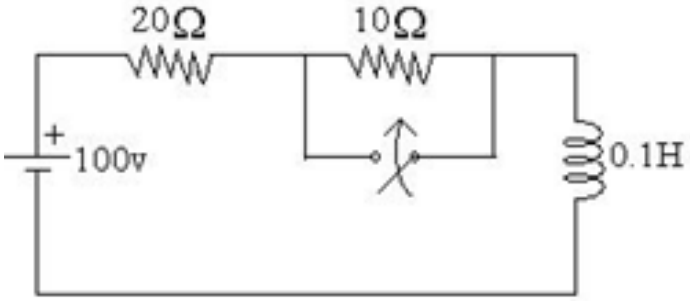
OR

9 (a) Derive transmission parameters in terms of open circuit impedance parameters and h-parameters.

(b) State and prove Superposition theorem with suitable example.

UNIT – V

10 A dc voltage of 100 V is applied in the circuit shown in figure below and the switch is kept open. The switch is closed at t = 0. Find the complete expression for the current.



OR

11 A series RLC circuit with R = 3 Ω, L = 1H and C = 0.5F, is excited by a unit step voltage. Obtain the expression for I(t) using Laplace Transform method. Assume that the circuit is initially relaxed. Sketch the variation of I(t) and state whether the circuit is over damped, or under damped or critically damped.

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