Code: RR 100206

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B.Tech I Year (RR) Supplementary Examinations, May 2012

NETWORK THEORY

(Common to EEE, ECE, CSE, EIE, BME, IT, E.Con.E, CSS and ECC)

Time: 3 hours Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

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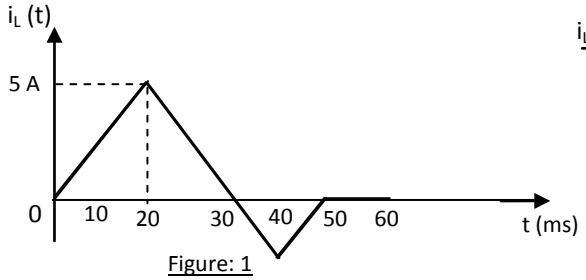
1 (a) State and explain Kirchoff's Laws.

(b) Explain with an example how a practical voltage source can be replaced by an equivalent current source.

(c) With reference to the figure shown in figure (1). Sketch $v_L(t)$ as a function of time, $0 < t < 60$ ms and also find the energy stored in the inductor at t = 40 ms.



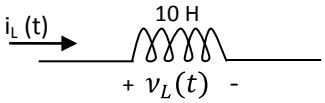


Figure: 1

2 (a) Two coils in series, when measured give the total inductance values as 0.7 H and 0.6 H, depending on the connection, one coil alone is found to have 0.45 H. Find the mutual inductance of the coils and the coupling coefficient.

(b) Determine the resistance across the terminals ab of the interconnected resistors shown in the figure 2.

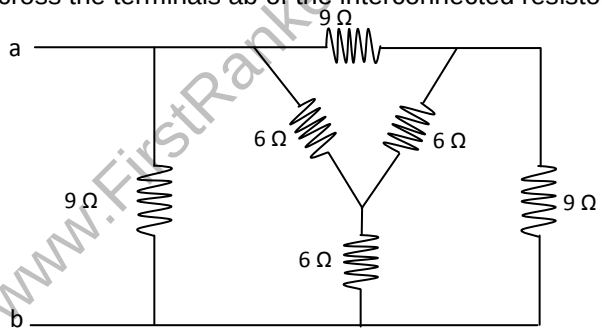


Figure : 2

3 (a) Derive an expression for resonance frequency of a series R-L-C circuit.

(b) A coil of resistance for resonance of 0.1 H is connected in series with a capacitor of capacitance 150 μF across a 200 V, 50 Hz supply calculate (i) Impedance (ii) Current (iii) Power and power factor of the circuit.

4 (a) Derive the expressions for two wattmeter readings used to measure power in balanced 3-phase loads.

(b) A balanced, 3-phase load is supplied from a symmetrical 3-phase, 400 V, systems. The current in each phase is 30 A and lags 30^0 behind the phase voltage. Find the impedance and total active and reactive power if the load is star connected.

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5 (a) State and explain Thevenin's theorem.

(b) For the a.c. bridge network shown in figure 3, determine the current flowing in the capacitor, and its direction, by using Thevenin's theorem. Assume the 30 $\angle$ 0^0 V source to have negligible internal impedance.

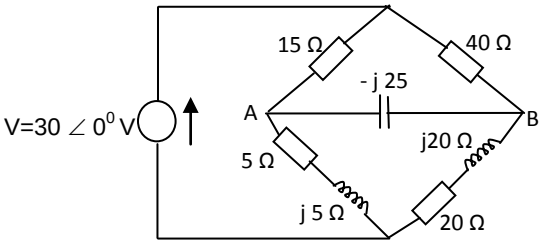

Figure :3

6 (a) Estimate the admittance parameters and hence determine the hybrid parameters of the network shown in figure (4) in transform parameters.

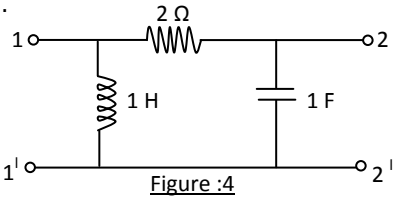

Figure :4

(b) Derive the expressions for the elements of m-derived $\prod$ filter interms of prototype $\prod$ filter.

7 (a) Compare the classical and Laplace transform methods of solution of the network.

(b) For the network shown in figure 5, obtain $V_c(t)$ using Laplace transform technique. Assume $V_i(t)$ as unit rectangular pulse with width T and take $V_c(0-) = 0$ V.

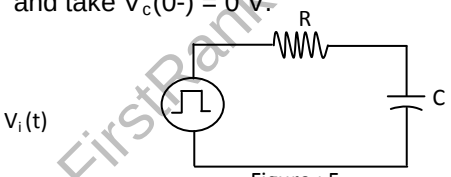

Figure : 5

8 (a) What is duality? Explain the procedure for obtaining the dual of the given planar network shown in the figure 6.

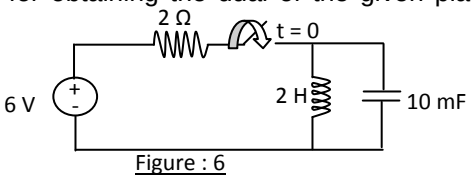

Figure : 6

(b) Explain the main steps in the procedure for obtaining the fundamental Crust matrix of a topological graph of a network.