Code: 15A04201 **R15**

B.Tech I Year II Semester (R15) Supplementary Examinations November 2017

NETWORK ANALYSIS

(Common to ECE & EIE)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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

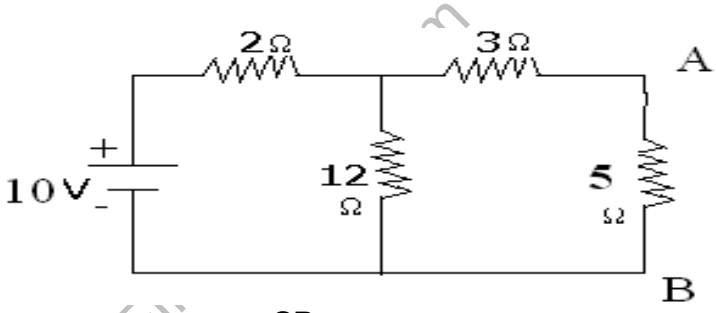
(a) What is linearity?
(b) State Millman's theorem.
(c) When an inductor is connected in a circuit, what is the status of inductor under transient state condition? Draw the equivalent circuit.
(d) When a capacitor is connected in a circuit, what is the status of capacitor under transient state condition? Draw the equivalent circuit.
(e) Define admittance and instantaneous power.
(f) Define r.m.s value and average value.
(g) What is the current in the series R-L-C circuit at resonance? What is the reason for that?
(h) What is a linear transformer?
(i) Define transmission parameters.
(j) Draw constant-k high pass filter (proto type).

PART – B

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

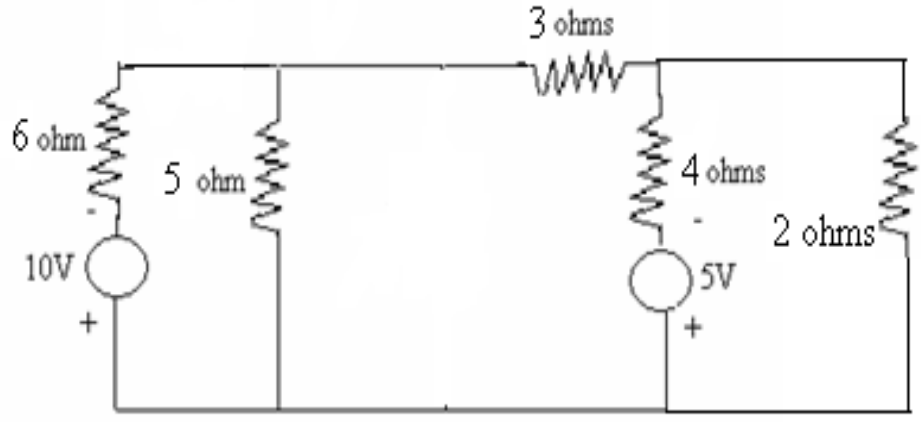
UNIT – I

2 (a) State and explain superposition theorem.
(b) By using Norton's theorem, determine the current through 5 Ω resistor (All resistances are in Ω) as shown in figure below.



OR

3 (a) State and explain reciprocity theorem.
(b) By using nodal analysis, find the current flowing through 3 ohms resistor.



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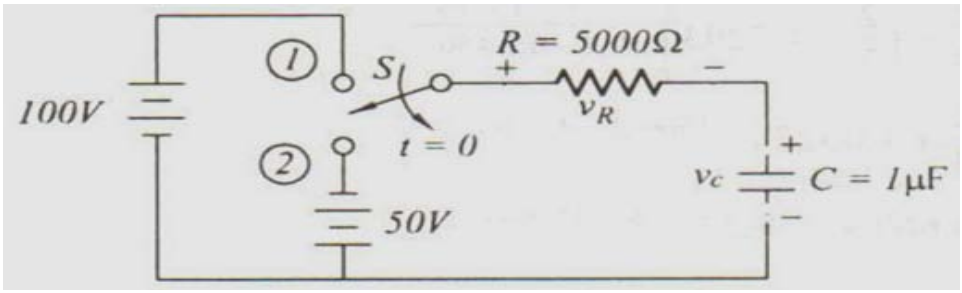
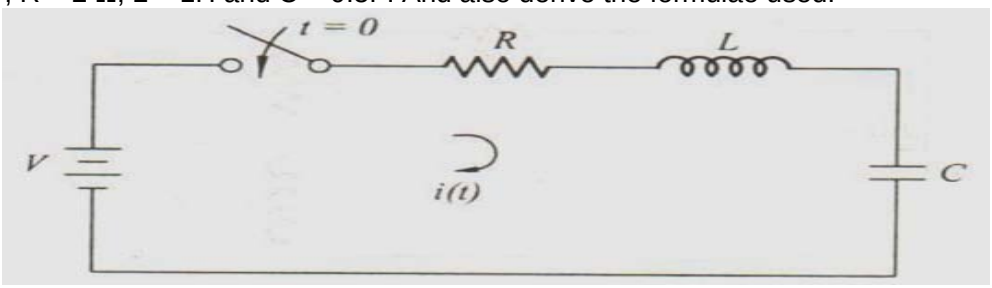
UNIT – II

4 The switch in the circuit shown below is moved from position (1) to (2) at t = 0. Find the expression for V_C and V_R for t > 0. And also derive the formulae used.



OR

5 For the network shown in figure below, determine the expression for i(t). The switch is closed at t = 0. Take V = 1 V, R = 2 Ω, L = 1H and C = 0.5F. And also derive the formulae used.



UNIT – III

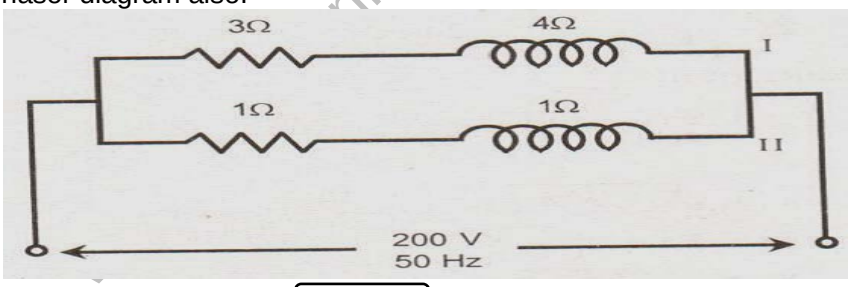
6 (a) Derive the expression for instantaneous power when a series R-L-C circuit excited by a sinusoidal source.

(b) A single phase load takes 300 watts and draws 5 A at a lagging power from a 120 V, 1-ø supply. Determine the reactance of a pure capacitor required to be placed in series with this load so that it takes the same current when connected to a 240 V supply.

OR

7 (a) Show that the power dissipated by a pure inductor excited by a sinusoidal voltage source is zero.

(b) For the following figure, calculate: (i) Conductance and susceptance of each branch. (ii) The resultant admittance. (iii) The current in each branch. (iv) Total current input. (v) The power delivered to the circuit. Draw the phasor diagram also.



UNIT – IV

8 (a) Explain in detail about ideal transformer.

(b) An inductance of 0.5 H, a resistance of 5 Ω, and a capacitance of 8 μF are in series across a 220 V AC supply. Calculate the frequency at which the circuit resonates. Find the current at resonance, Band width, half power frequencies and the voltage across capacitance at resonance.

OR

9 (a) Derive the expression for Q-factor in a series R-L-C circuit.

(b) The Q-factor of a RLC circuit is 5 at its resonance frequency of 1 kHz. Assuming the power dissipation of 250 W when the current drawn is 1 A, find the circuit parameters. Determine the BW of the circuit.

UNIT – V

10 (a) Derive the relation between impedance and admittance parameters.

(b) A prototype high pass filter has a cut off frequency of 8 kHz and a nominal impedance of 600 Ω. Calculate the values of inductance and capacitance used in the filter.

OR

11 (a) Derive the relation between hybrid and impedance parameters.

(b) Design a prototype band pass filter with cut off frequencies 1.5 kHz and 5 kHz and a design impedance of 500 Ω.

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