Code: 15A04201

R15

B.Tech I Year II Semester (R15) Supplementary Examinations December 2019

NETWORK ANALYSIS

(Common to ECE & EIE)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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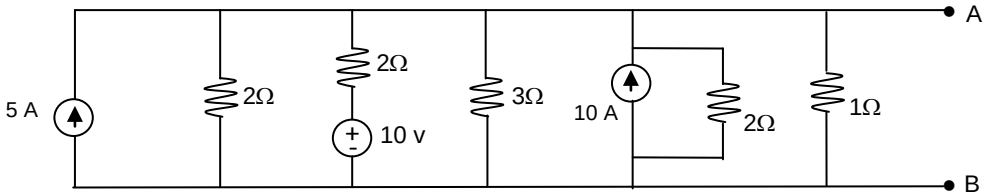
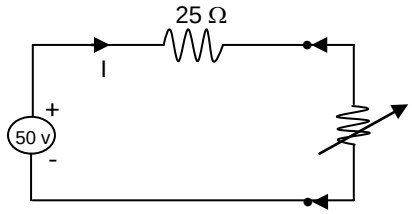
1 Answer the following: (10 X 02 = 20 Marks)

(a) By using source transformation, convert the circuit shown in figure below into a single voltage source and single resistance.



(b) In the circuit shown in figure below, determine the value of load resistance when the load resistance draws maximum power. Also find the value of maximum power.



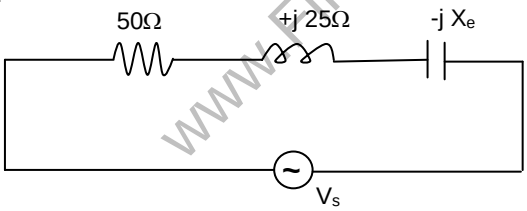
(c) Define transient time and transient response.

(d) What are critical frequencies? Why are they so called?

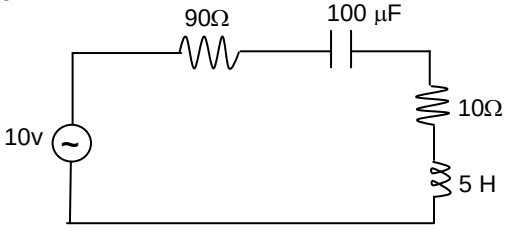
(e) Determine the average power delivered to the circuit consisting of an impedance z=5+j8 when the current flowing through the circuit is $I=5\angle 30^{o}$ A.

(f) Illustrate the power triangle.

(g) For the circuit shown in figure below, determine the value of capacitive reactance and impedance at resonance.



(h) For the circuit shown in figure below, determine the value of Q at resonance and bandwidth of the circuit.



(i) Write the transmission parameters.

(j) Relate the characteristic impedance of T and π network.

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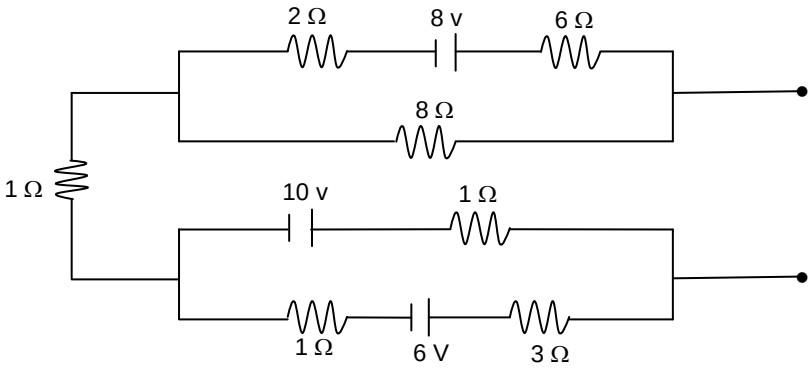
PART – B

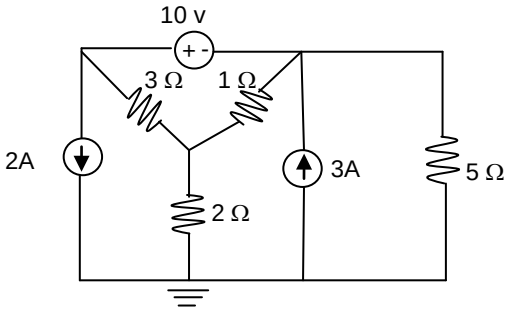
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) State and prove Thevenin's theorem, find R_{th} and V_{th} for the network shown in figure below.

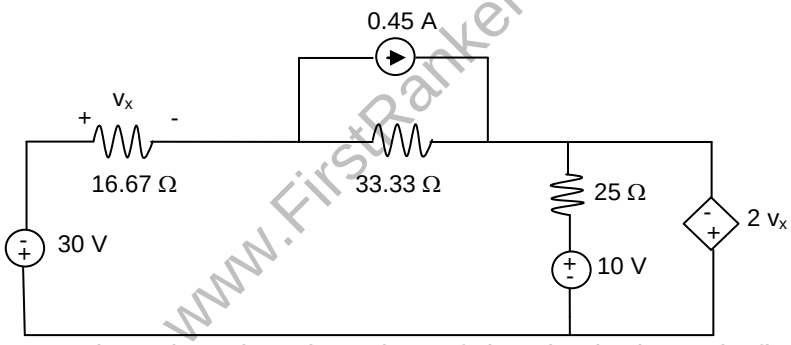


(b) Find the power delivered by 5A current source in the circuit shown in figure by using nodal method.

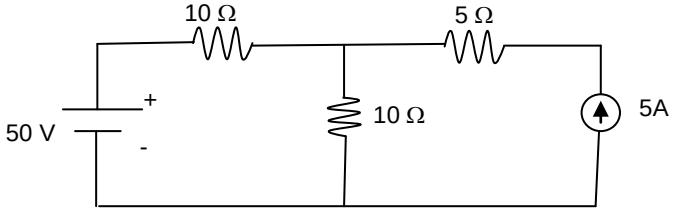


OR

3 (a) Use mesh analysis to find V_x in the circuit shown in figure below.



(b) Find the current through various branches of the circuit shown in figure below by employing the superposition theorem.



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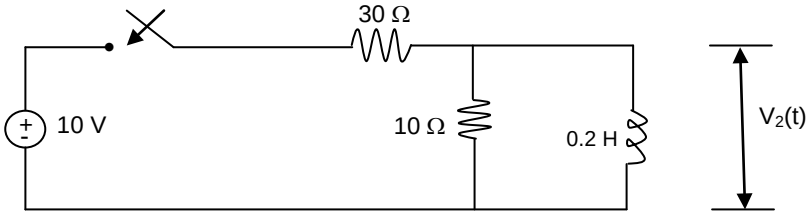
UNIT – II

4 (a) Derive the DC response of an RC circuit. Also derive the voltage across the capacitor and resistor. Draw its responses.

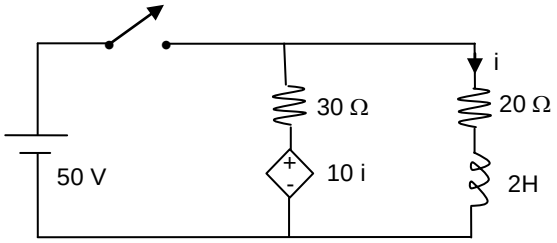
(b) For the above circuit, consider R = 10Ω, C = 0.1F and a constant voltage of 20 V is applied to the circuit at t = 0. Obtain the current equation, voltage across the capacitor and resistor.

OR

5 (a) The switch in the circuit shown in figure below is closed at t = 0. Find $V_2(t)$ for all $t \geq 0$ by time domain method. Assume zero initial current in the inductance.

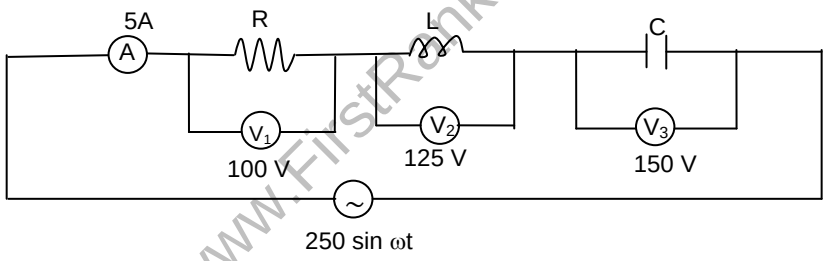


(b) For the circuit shown in figure below, find the current in the 20 Ω when the switch is opened at t=0.



UNIT – III

6 (a) For the circuit shown in figure below, a voltage of $250 \sin \omega t$ is applied. Determine the power factor of the circuit.



(b) A series RL circuit draws a current of $i(t) = 8\sin(50t + 45°)$ from the source. Determine the circuit constants, if the power delivered by the source is 100w and there is a lagging power factor of 0.707.

OR

7 (a) What is the relation between bandwidth and resonant frequency?

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

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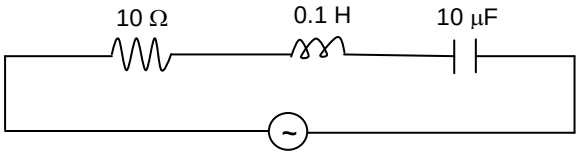
UNIT – IV

8 (a) Determine the impedance at resonant frequency, 10 Hz above resonant frequency and 10 Hz below resonant frequency for the circuit shown in figure below.



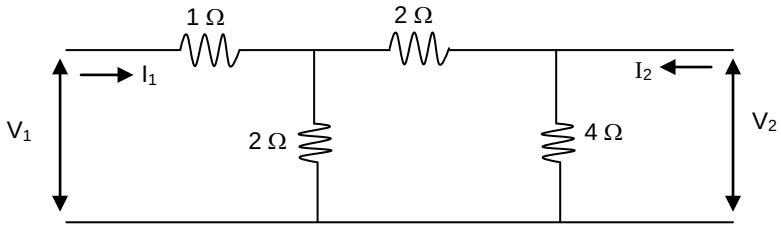
(b) Derive the Q-factor of a parallel resonance circuit.

OR

9 Derive the voltages of a series RLC circuit. Also derive the bandwidth of it.

UNIT – V

10 For the circuit shown in figure below, compute its z, y and h-parameters.



OR

11 (a) Design a constant k-low pass filter and high pass filter having a cutoff frequency of 1 kHz with a load resistance of 600Ω.

(b) Draw the ideal frequency responses of low pass filter, high pass filter, Band pass and Band stop filter.

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