B.Tech I Year II Semester (R15) Regular & Supplementary Examinations May/June 2019

NETWORK ANALYSIS

(Common to ECE & EIE)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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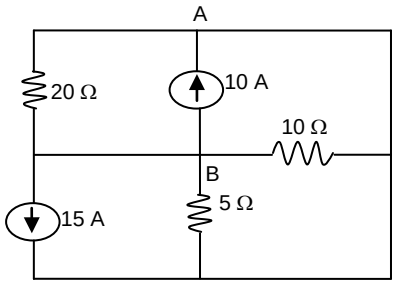
1 Answer the following: (10 X 02 = 20 Marks)

(a) Determine the voltage drop across the 10Ω resistance in the circuit shown in figure.



(b) State maximum power transfer theorem.

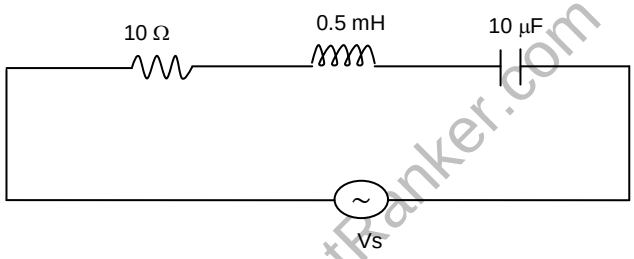
(c) Distinguish between natural and forced response.

(d) Write the differences between RL and RC transient circuits.

(e) If the phase angle θ is 45°, what is the power factor?

(f) Define instantaneous power and average power.

(g) Determine the resonant frequency for the circuit shown in figure below.



(h) Illustrate the concept of mutual inductance.

(i) For a given Z_{11}=3Ω, Z_{12}=1Ω, Z_{21}=2Ω and Z_{22}=1Ω, find the admittance matrix and the product of Δ_y and Δ_z.

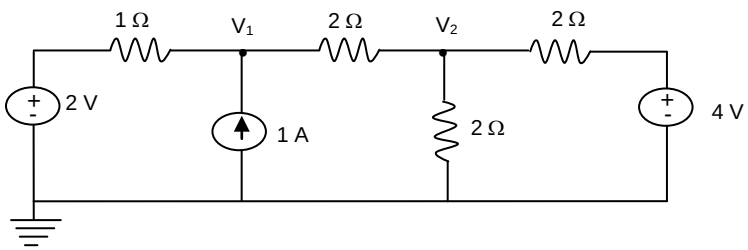
(j) For a two port network, define and relate Decibel and Neper.

PART – B

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

UNIT – I

2 By applying the superposition theorem determine the node voltage V_1 and V_2 for the network shown in figure.



OR

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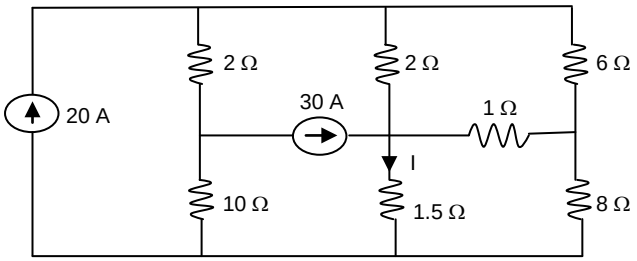
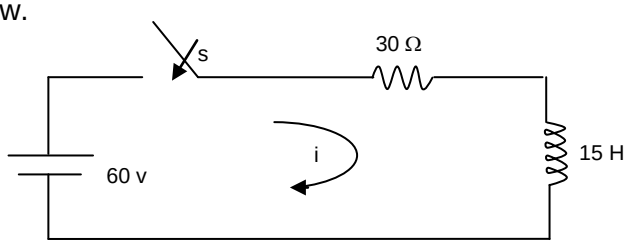
3 Determine the current flowing through 1.5 Ω resistor in the circuit shown in figure by loop analysis.



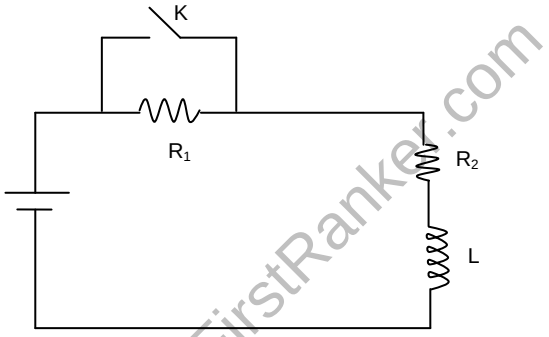
UNIT – II

4 (a) A series RL circuit with R = 30Ω and L = 15H has a constant voltage V = 60V applied at t = 0 as shown in figure below.



Determine the current I, voltage across the resistor and inductor.

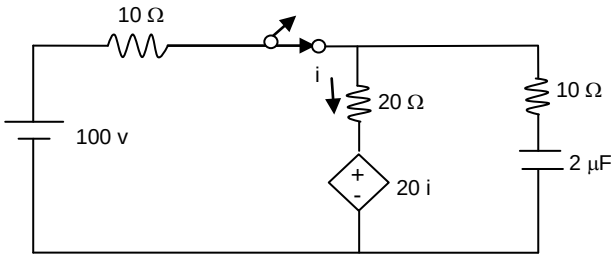
(b) In the given circuit shown in figure below, the switch k is closed at time t = 0, the steady state condition having reached preciously. Obtain the expression for the current in the circuit at any time t. If $R_1 = R_2 = 100\Omega$, v = 10v and L = 1H, calculate at time t = 5 ms (i) Current I. (ii) Voltage drop across R_2. (iii) Voltage across L.



OR

5 (a) An RL series circuit is excited by a sinusoidal source e(t) = 10sin100t volts, by closing the switch at t = 0. Take R = 10Ω and L = 0.1H. Determine the current i(t) flowing through the RL circuit.

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



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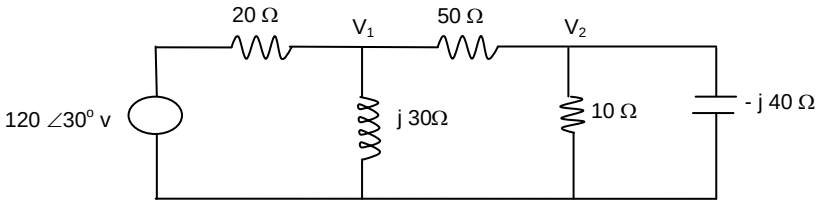
UNIT – III

6 With necessary derivations, illustrate the concept of instantaneous power, average power, apparent power and reactive power.

OR

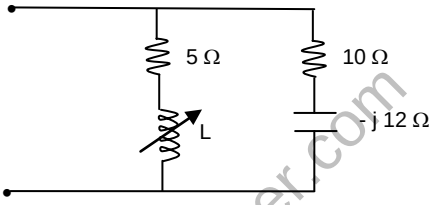
7 (a) For the circuit shown in figure below, find:
(i) Real power dissipated by each element.
(ii) The total apparent power supplied by the circuit.
(iii) The power factor of the circuit



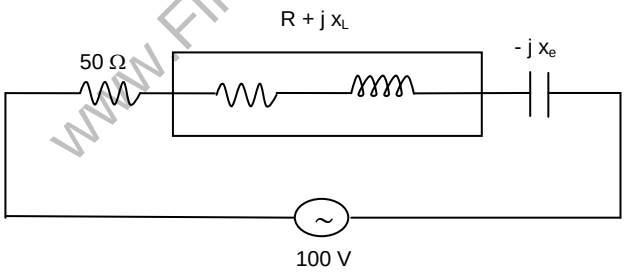
(b) Two impedances $Z_1 = 10\angle -60°\Omega$ and $Z_2 = 10\angle -70°\Omega$ are in series and pass an effective current of 5A. Determine the active power, reactive power, apparent power and power factor.

UNIT – IV

8 (a) Find the value of L at which the circuit resonates at a frequency of 1000 rad/sec in the circuit shown in figure below.



(b) A 50Ω resistor is connected in series with an inductor having internal resistance, a capacitor and 100 V variable frequency supply as shown in figure below. At a frequency of 200 Hz, a maximum current of 0.7A flows through the circuit and voltage across the capacitor is 200 V. Determine the circuit constants.



OR

9 (a) Derive the relation between bandwidth and quality factor.
(b) Analyze ideal transformer circuits.

UNIT – V

10 Derive the Z-parameters of two port network. Relate Y, h and ABCD parameters with Z-parameter.

OR

11 (a) Derive the characteristic impedance of T-network.
(b) Design a low pass filter (both π and T sections) having cut off frequency of 2 kHz to operate with a load resistance of 500Ω.

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