

III-SEM/ETE/AE & IE/ECE/ 2021(W)

TH-II Circuit Theory

Full Marks: 80

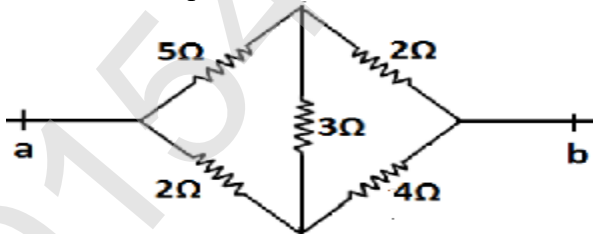
Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

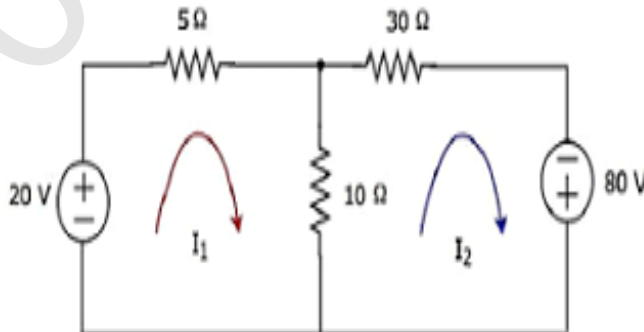
1. Answer **All** questions 2 x10
- Convert a 20V voltage source having internal resistance of 10 ohm into an equivalent current source.
 - A 12V voltage source, 4Ω resistor and 6Ω resistor are connected in series. Find the voltage drop at each resistor using voltage division rule.
 - State Maximum power transfer theorem.
 - Under which conditions superposition theorem is applicable?
 - Define Form Factor.
 - Find out the Time constant of a series RC circuit if $R= 1K\Omega$, $C=1mF$.
 - Draw the resonance curve of Series RLC and Parallel RLC circuit.
 - Represent a parallel RLC circuit of $R=10\ \Omega$, $L=5H$ and $C=100mF$ in Laplace Domain.
 - Draw a simple resistive (a) T-network (b) Pi-network
 - Write down the voltage and current equations related to Z-parameters and Y-parameters of a two port network.

2. Answer **Any Six** Questions 5X6

- a. Find out the equivalent resistance between node 'a' and 'b'.

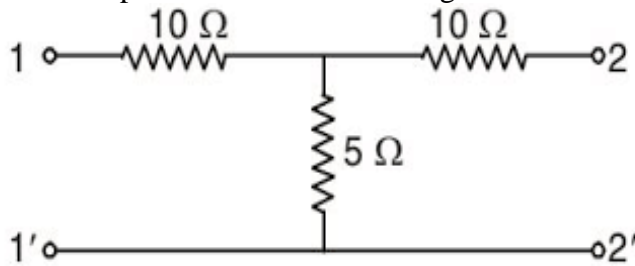


- b. Find loop currents I_1 and I_2 using mesh analysis in the below circuit.



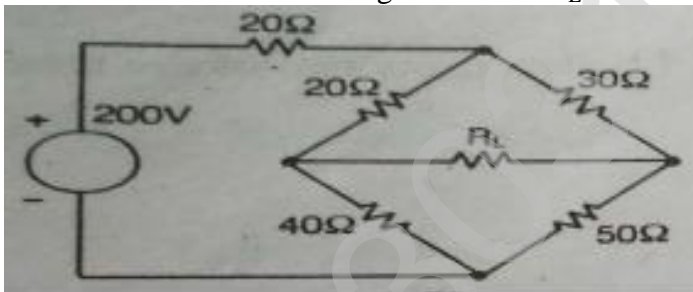
- c. Explain the step followed to solve a circuit using Norton's theorem.

- d. In an AC Circuit, Derive the expression for current in pure capacitor. Draw the phasor for Voltage and Current.
- e. Determine the values of R, L, C of a parallel RLC circuit, If it's resonant frequency is 10KHz and Quality factor is 20.
- f. Find the z-parameters of the circuit given below.

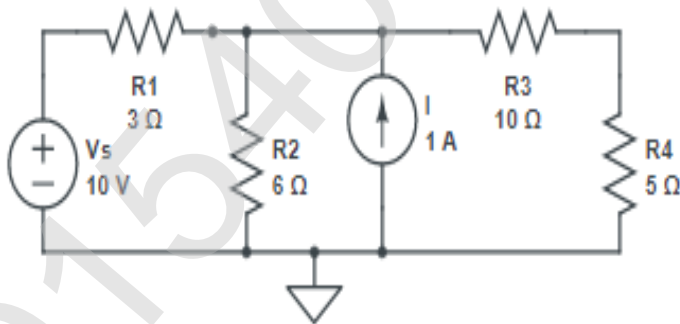


- g. Determine the impulse response of series RC and RL circuit.

3 Determine the current flowing in Resistor R_L . 10



4 Find the current in 5Ω resistor in the below shown circuit using Thevenin's theorem. 10



5 A $50\angle 0^\circ$ V ac supply of 50Hz frequency is applied to a Series RL circuit having $R=100\ \Omega$, $L=20\text{mH}$. Determine current, power factor, active power, reactive power and draw the power triangle. 10

6 Derive the expression for resonant frequency in a series RLC circuit. If $R=2\ \Omega$, $L=1\text{mH}$, $C=4\text{nF}$, Determine Resonance Frequency, Q-factor, Bandwidth and half power frequencies. 10

7 Define and classify filters. Explain various types of filters with frequency response. 10