

Total No. of printed pages = 3

ECE 181304

Roll No. of candidate

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2/3/22 2021

B.Tech. 3rd Semester End-Term Examination

ECE, ETE, PETE

NETWORK THEORY

(New Regulation and New Syllabus)

Full Marks - 70

Time - Three hours

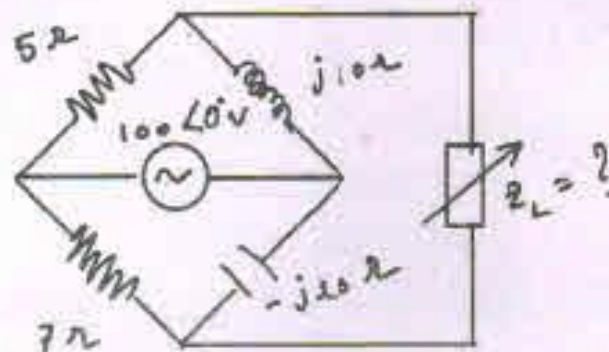
The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any six from the rest.

1. Answer the following: (10 × 1 = 10)
- In a series RLC high Q circuit, the current peaks at a frequency _____.
 - A series RLC circuit consisting of $R = 10 \text{ ohm}$, $X(L) = 20 \text{ ohm}$, $X(c) = 20 \text{ ohm}$ is connected across an ac supply of 200 V rms. The rms voltage across the capacitor is _____.
 - For a series resonant circuit at low frequency, circuit impedance is _____ and at a high frequency circuit impedance is _____.
 - Three identical resistances connected in-star carry a current of 12 A. If the same resistance are connected in delta across the same supply, what will be the line current?
 - The graph of an electrical network has n nodes and b branches. The numbers of links with respect to the choice of a tree is gives by _____.
 - The Laplace transform of a unit ramp function starting at $t = a$ is _____.
 - When a unit impulse voltage is applied to an inductor of 1H, what will be the energy supplied by the source?
 - A two port network has transmission parameters. What will be the input impedance of the network at port 1?
 - With the usual notations, a two port resistive network satisfies the conditions $A = D = (3/2)B = (4/3)C$. What will be the Z_{11} of the network?
 - For a symmetrical bilateral network, if $A = 3$ and $B = 1$, what will be the value of the parameter C?

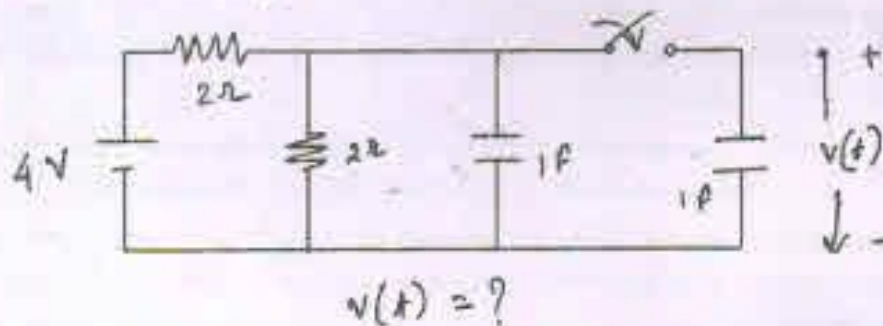
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2. When a 3-phase system is said to be a balanced system? Find the Relationship between line voltage and phase voltage, line current and phase current and power. Also draw its phasor diagram. (10)
3. Find the value of $Z(L)$ for maximum power transfer in the network shown and find maximum power. (10)

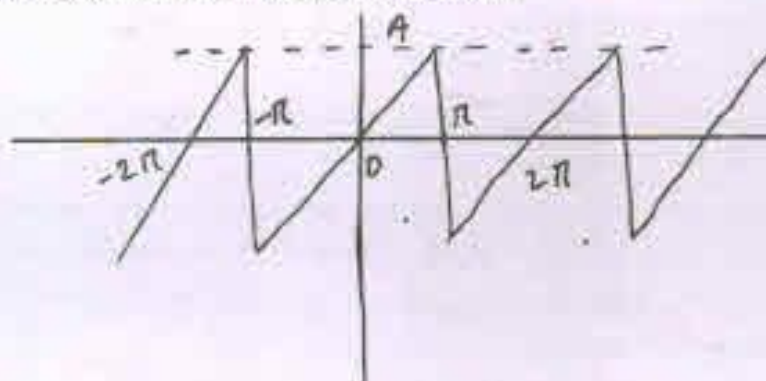


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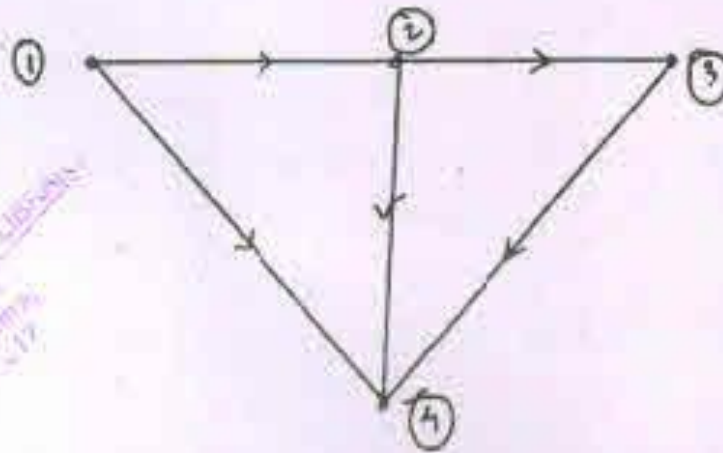
4. Derive the equation $Q = \text{resonant frequency} / \text{Bandwidth}$, where Q is quality factor. (10)
5. Impedance of a circuit is observed to be capacitive and decreasing from 1Hz to 100 Hz. Beyond 100 Hz the impedance start increasing. Find the values of circuit elements if the power drawn by this circuit is 100 Watt at 100 Hz, when the current is 1 A. The power factor of the circuit at 70Hz is 0.707. (10)
6. The network has acquired steady-state at $t < 0$ with the switch open. The switch is closed at $t = 0$. Determine $v(t)$. (10)



7. Find the conditions of reciprocity and symmetry for short circuit network and also draw its equivalent circuit. (10)
8. Find the Fourier expansion of the given waveform. (10)



9. What are the chief properties of a passive filter? Differentiate between active and passive filter. (5+5 =10)
10. Define tree, cut-set & tie-set. Obtain the incidence matrix of the graph shown. What are the properties of an incidence matrix? (5+3+2 =10)



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