R20

I B. Tech II Semester Supplementary Examinations, March - 2022
NETWORK ANALYSIS
(ECE, EIE, ECT)

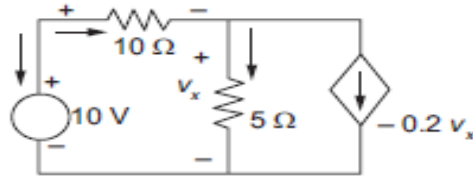Time: 3 hours   Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks
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UNIT-I

1 a) Distinguish between dependent and independent sources. How do you transform a voltage source in to a current source?   (7M)

   b) For the following circuit find the power consumed by the resistors, power delivered by the independent source and power delivered by the dependent source.   (7M)
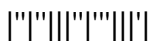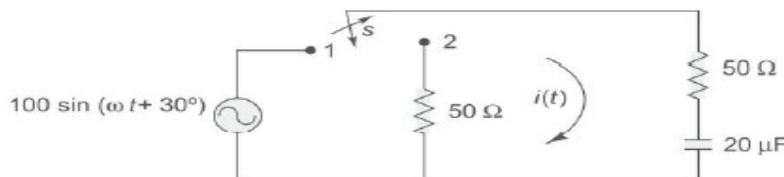

Or

2 a) Explain the principle of Duality with an example.   (7M)

   b) In a circuit two parallel branches Z_1 and Z_2 are in series with Z_3. The impedances are $Z_1 = 5 + j8$, $Z_2 = 3 - j4$ and $Z_3 = 8 + j11$. The voltage across Z_3 is 50 V. Find currents through the parallel branches and phase angle between them.   (7M)

UNIT-II

3 a) Analyze the dc response for a series R – C circuit.   (7M)

   b) Define the term 'Time constant 'of a circuit.   (3M)

   c) Find the current i(t) for a series RLC circuit comprising R = 2 ohms, L = 3 H, and C = 1 F, when a ramp voltage of 12 volts is applied. Assume initial condition as zero.   (4M)

Or

4   For the network shown below, the switch is moved from the position 1 to the position 2 at t = 0. The switch is in the position 1 for a long time. Initial charge on the capacitor is 7×10^{-4} coulombs. Determine the current expression i(t), when $\omega = 1000$ rad/sec.   (14M)
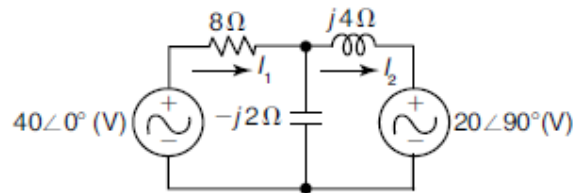
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UNIT-III

5 a) when two coils of self-inductances L_1 and L_2 are connected in parallel with aiding (7M)
connection and having a mutual inductance M then prove that the total inductance
is equal to $L_{eqv} = \frac{L_1 L_2 - M^2}{L_1 + L_2 - 2M}$

b) An ac voltage of 200 V is applied to a series circuit consisting of a resistor, an (7M)
inductor, and a capacitor. The respective voltages across these components are 170
V, 150 V, and 100 V and the current is 4 A. Find the power factor of the inductor
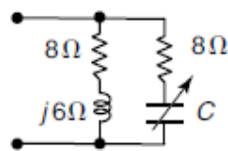and also for the circuit.

Or

6 a) Explain step by step procedure of phasor analysis for a Series R – C circuit. (7M)

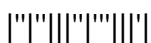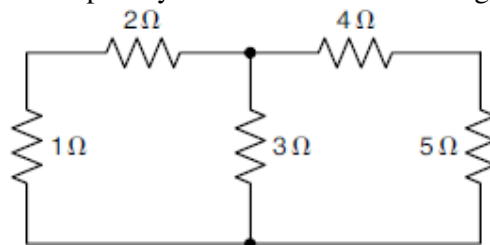b) Calculate the average power absorbed by each of the element in the following (7M)
circuit:

UNIT-IV

7 a) Explain why at resonance, the current is maximum in a series circuit and minimum (3M)
in a parallel circuit.

b) Derive the expression for Q factor for RL series circuit. (4M)

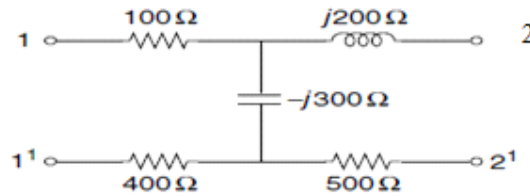c) Find C in the following circuit which results in resonance, when   = 5000 rad/s. (7M)

Or

8 a) State and explain Reciprocity theorem. (4M)

b) Verify the reciprocity theorem for the following network (10M)

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UNIT-V

9   a)   Derive the related Y – parameters w.r.t driving point admittances and transfer   (7M)
         admittances at input and output ports of a two-port network.

     b)   Find the Z – parameters for the following network   (7M)

Or

10   a)   Derive the transmission parameters of a two-port network   (7M)

     b)   Determine hybrid parameters for the network shown below and also check   (7M)
         whether the network is reciprocal