

BACHELOR OF TECHNOLOGY (C.B.C.S.) (2020 COURSE)
 B.Tech.Sem - IV ELECTRICAL : WINTER- 2022
 SUBJECT : NETWORK & SYNTHESIS

Day : Friday

Time : 02:30 PM-05:30 PM

Date : 25-11-2022

W-24549-2022

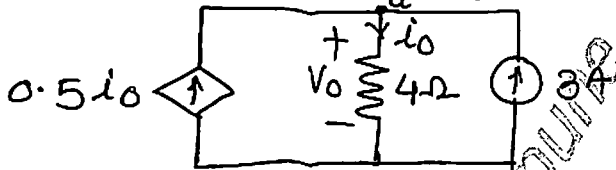
Max. Marks : 60

N.B.

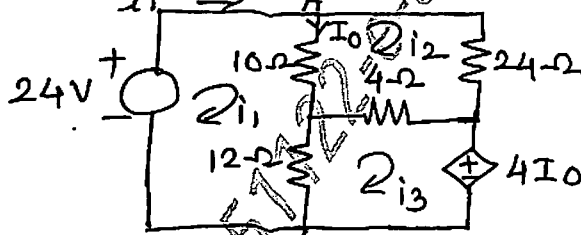
- 1) All questions are COMPULSORY.
- 2) Figures to the right indicate FULL marks.

- Q.1 a) Define following terms related to Electrical Network : (05)
- i) Network and circuits
 - ii) Linear and non-linear circuits
 - iii) Active and Passive circuits
 - iv) Unilateral and Bilateral circuits
 - v) Time variant and invariant circuit

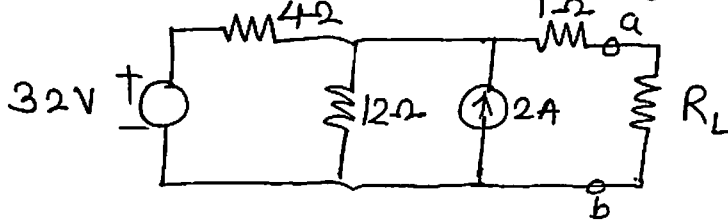
- b) Determine v_0 and i from the following circuits. (05)



- Q.1 a) State and explain Kirchoff's Current Law (KCL) and Kirchoff's Voltage Law (KVL) in detail. (05)
- b) Use mesh analysis to find the current i_0 in the circuit shown below: (05)

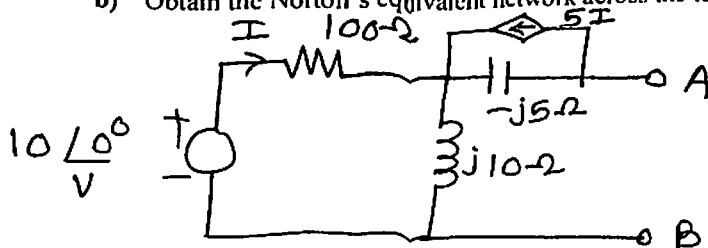


- Q.2 a) State and explain the Superposition theorem for ac circuits with steps and solve any one example. (05)
- b) Find the Thevenin's equivalent circuit shown in the following figure to the left of the terminal a-b. Then find the current through $R_L = 6\Omega$ and 36Ω . (05)



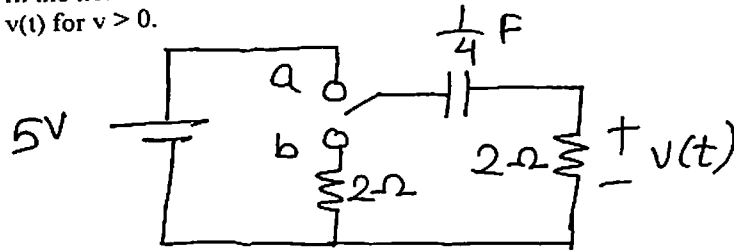
OR

- Q.2 a) State and explain Maximum Power Transfer Theorem for ac circuits with steps and solve any one example. (05)
- b) Obtain the Norton's equivalent network across the terminals A and B. (05)



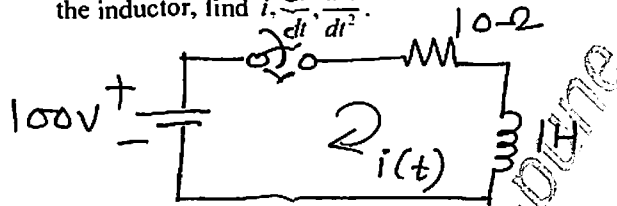
P.T.O.

- Q.3 a) The circuit consist of R and L connected in series with the DC power supply. (05)
Write down the derivation for finding time constant of series RL circuit, voltage across resistor and voltage across inductor for $t > 0$.
- b) In the network shown below, the switch is shifted to position b at $t = 0$. Find $v(t)$ for $t > 0$. (05)



OR

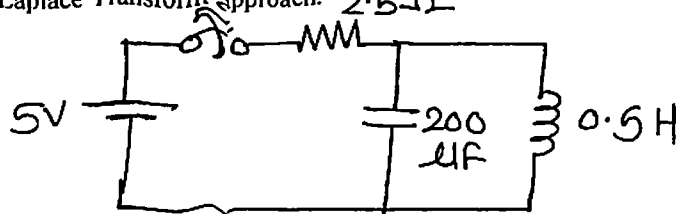
- Q.3 a) The circuit consist of R and C connected in series with the DC power supply. (05)
Write down the derivation for finding time constant of series RC circuit voltage across resistor and voltage across capacitor for $t > 0$.
- b) From the given network, the switch is closed at $t = 0$. With zero current in the inductor, find $i, \frac{di}{dt}, \frac{d^2i}{dt^2}$. (05)



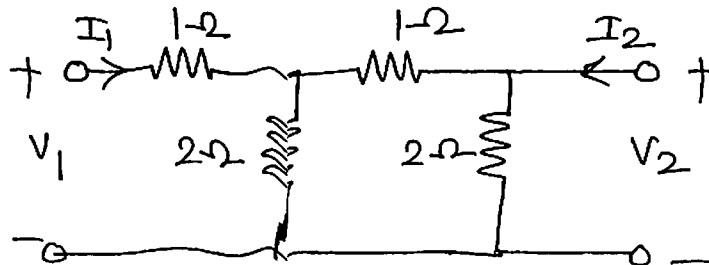
- Q.4 a) Write down the Laplace transform of the following function: (05)
i) Unit step function
ii) Delayed or shifted unit step function
iii) Unit ramp function
iv) Delayed unit ramp function
v) Unit impulse function
- b) A function in s-domain is given by $F(s) = \frac{50}{s^2 + 2s + 2}$. Find the inverse Laplace transform. (05)

OR

- Q.4 a) Write any five properties of Laplace Transform. (05)
- b) In the network shown below, the switch is closed and steady state is attained. At $t = 0$, switch is opened. Determine the current through the inductor. Use Laplace Transform approach. (05)



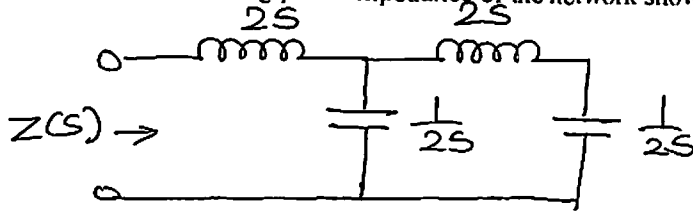
- Q.5 a) Develop the relation between Z parameter and Y parameter. (05)
- b) Find Z-parameters for the following network. (05)



OR

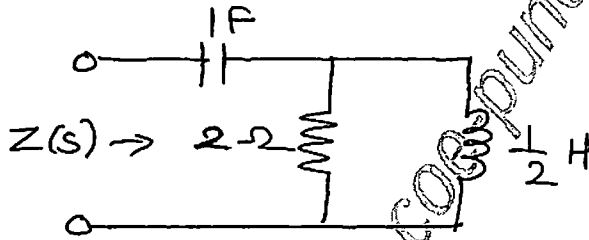
- Q.5 a) What is filter? Classify four types of filters and explain in detail. (05)
b) Design T and π section constant K high pass filter having cut off frequency of 12 kHz and nominal impedance $R_0 = 500 \Omega$. Also find : (05)
i) Its characteristics impedance and phase constant at 24 kHz.
ii) Attenuation at 4 kHz.

- Q.6 a) For the given network function, draw pole-zero plot $V(s) = \frac{5*(s+5)}{(s+2)*(s+7)}$. (05)
b) Determine the driving point impedance of the network shown below: (05)



OR

- Q.6 a) Explain the restrictions on pole and zero locations for driving point functions. (05)
b) Find the poles and zeros of the impedance of the following network and plot them on the s-plane. (05)



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