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Paper Code : PC-EE301/PC-EEE301 Electric Circuit Theory

UPID : 003519

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(I) While calculating Rth in Thevenin's theorem and Norton equivalent. What condition of the following is necessary?
(a) all independent sources are made dead
(b) only current sources are made dead
(c) only voltage sources are made dead
(d) all voltage and current sources are made dead

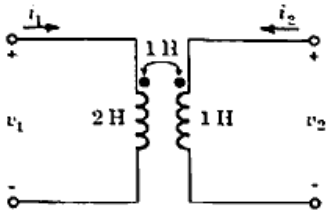
(II) Write down the condition of Reciprocity of Two port network?

(III) An RC coupling circuit is an example of what type of filter?

(IV) What is the expression of energy stored in a capacitor?

(V) What is the value of internal resistance of the voltage source?

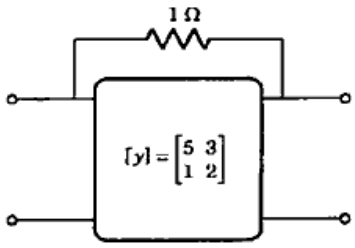
(VI) For the circuit given below $i_1 = 4\sin(2t)$ and $I_2 = 0$. What is the value of v_2?



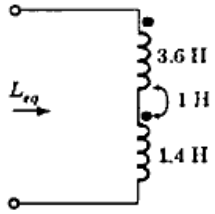
(VII) .The [y] parameter of a two port network is given by

$$[y] = \begin{bmatrix} 5 & 3 \\ 1 & 2 \end{bmatrix} \text{S}$$

1 ohm resistor is now connected across the previous network. The new [y] parameter will be



(VIII) Leq = ?



(IX) Find the function f2 (t) from the time t = 1 to 3 sec.

(X) Find an if the function f(x) = x – x3.

(XI) A step voltage V is applied to an RL series circuit. What is the value of current at t = 0

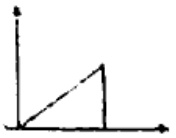
(XII) If a Loops contain only one link and that is independent then the loops are called _____.

Group-B (Short Answer Type Question)

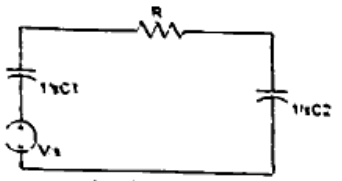
Answer any three of the following

2. Explain the condition of symmetry for Z parameters of two port network.

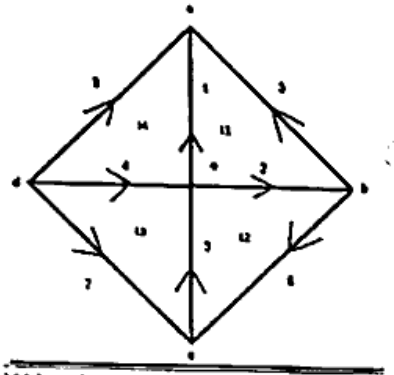
3. Find the function f(t) in terms of unit step function in the graph shown below.



4. For the circuit shown below, find the voltage across the capacitor C_1 at the time the switch is closed. [5]

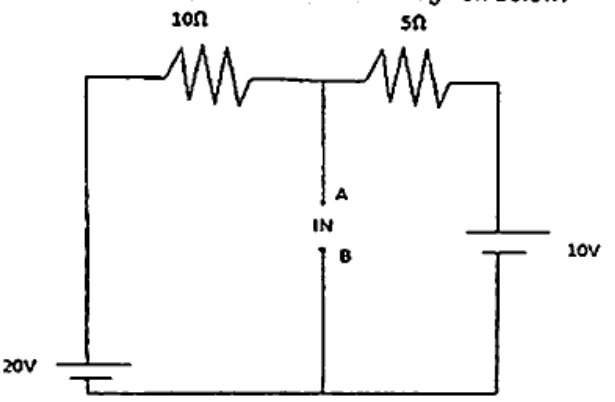


5. [5]



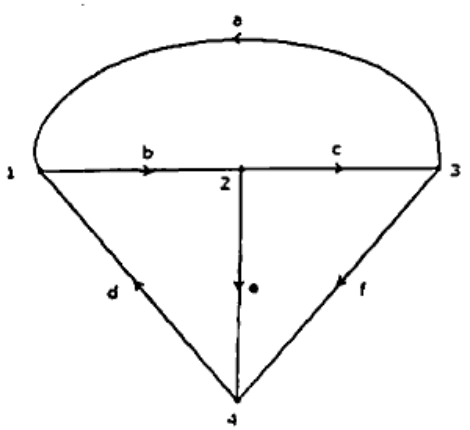
Write down the row formed at node 'a' in the cut set matrix in the figure shown above.

6. Find the Norton's current for the circuit given below. [5]



Group-C (Long Answer Type Question)
Answer any three of the following [15 x 3 = 45]

7. [15]



1. What is the Incidence Matrix corresponding to the above directed graph?

(a) What is the Fourier series expansion of the function f(x) in the interval (c, c+2π)? [5]

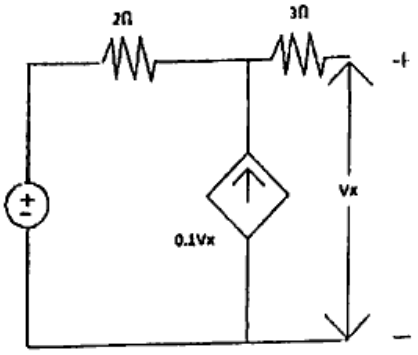
(b) Find the sum of $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\ldots$ using Fourier series expansion if f(x) = a when (0,π) and 2 π - x when (π, 2 π). [10]

9. (a) Find the Laplace transform of the function f (t) = 4t3 + t2 – 6t + 7. [7]

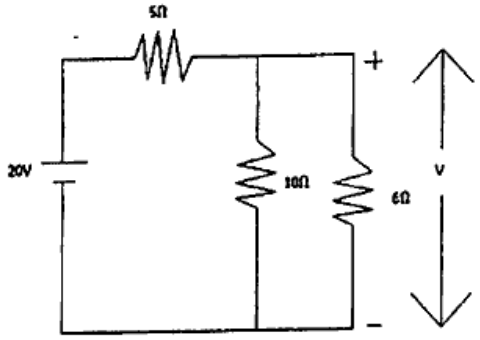
(b) Find the Laplace transform of ramp function r (t) = t. [4]

(c) If u (t) = 1 for t >= 0 and u (t) = 0 for t < 0, determine the Laplace transform of [u (t) – u (t – a)]. [4]

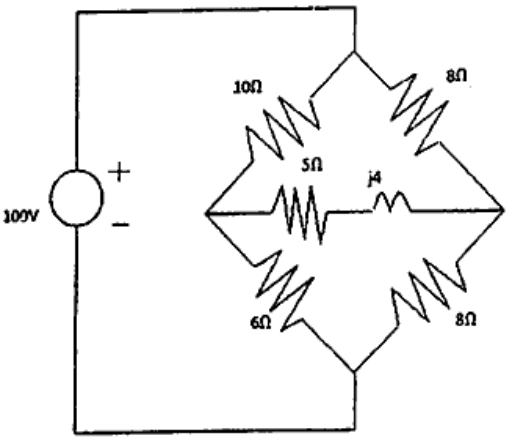
10. (a) Calculate Thevenin's voltage for the network shown below where the voltage source is 4V. [7]



(b) The voltage across 6Ω resistor is _____ [8]



11. (a) Find the current through (5+j4) Ω resistor. [10]



(b) Calculate the maximum power delivered across R_L of the circuit given. [5]