Total No. of printed pages = 6

19/3rd Sem/DECE305

2021

ELECTRIC CIRCUITS AND NETWORK

Full Mark – 100

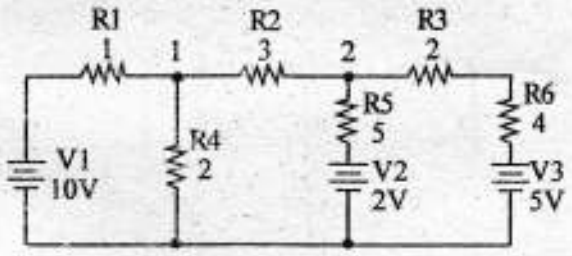
Time – Three hours

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

Answer any *five* questions.

1. (a) Point out the main differences between Nodal and Mesh analysis. 5

   (b) Find the voltage (V) at node 1 in the circuit shown by using Nodal analysis. 8



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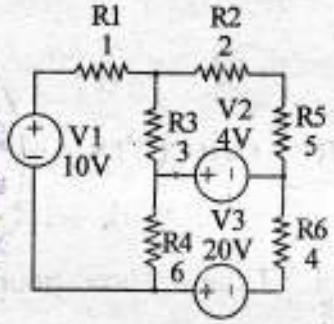
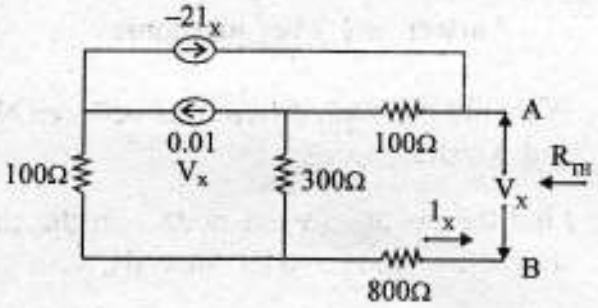
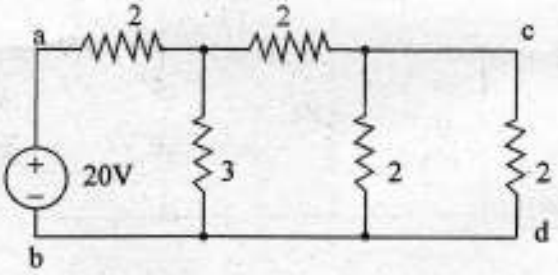
(c) Find the current I_3 (A) from the figure given below by using Mesh analysis. 7



2. (a) For the circuit shown in figure below, find the value of Norton's resistance : 5



(b) The following circuit satisfies Reciprocity Theorem. 1



True or False ?

(c) While considering Reciprocity theorem, we consider ratio of response to excitation as ratio of? 1

(a) voltage to voltage

(b) current to current

(c) voltage to current

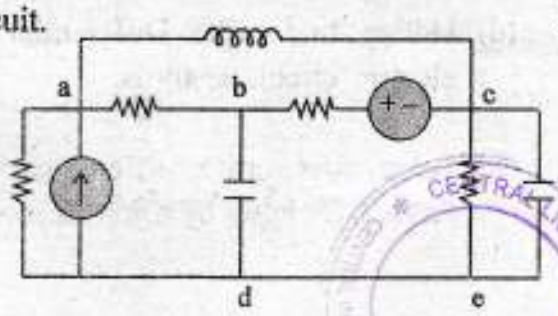
(d) None of the mentioned above

(d) Define maximum power transfer theorem. Also find the condition of maximum power transfer in an electrical circuit. 1+6=7

(e) For the incidence matrix shown below, draw the graph. 6

	1	2	3	4	5	6	7	8
a	1	0	0	0	1	0	0	1
b	0	1	0	0	−1	1	0	0
c	0	0	1	0	0	−1	1	−1
d	0	0	0	1	0	0	−1	0

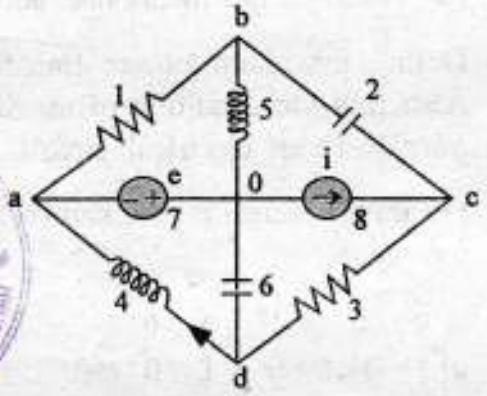
3. (a) Refer the circuit shown below. Draw the graph, one tree and its co-tree from the circuit. 6



(b) For the network shown below, determine the number of all possible trees. For a tree consisting of (1, 2, 3)

(i) draw tie set matrix

(ii) draw cut-set matrix. 6



(c) What do you mean by Time domain and frequency domain analysis ? Also differentiate between them. 2+3=5

(d) Define first order Differential equation of electric circuit analysis. 3

4. (a) Solve first order differential equation of series RC circuit by using its proper diagram. 7

(b) A series RL circuit with R = 35Ω and L = 20 H has a constant voltage V = 100 V applied at t = 0 by the closing of a switch. Find, 7

(i) The equation for i.

(ii) The current at t=1.65s

(iii) The expressions for V_R and V_L

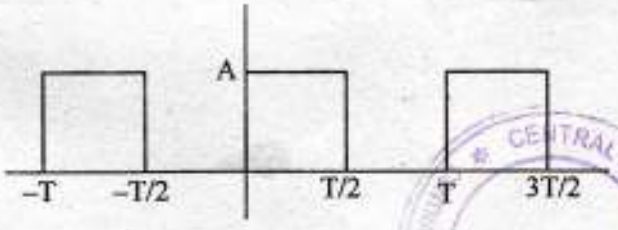
(iv) The time at which $V_R = V_L$

(c) Find the transient response of series RL circuit in details. 6

5 (a) What do you mean by Fourier series ? Also explain Dirichlet's condition of Fourier series. 2+4=6

(b) Explain about the three different coefficients (with equations) of Trigonometric Fourier series representation. 7

(c) Determine the Fourier series of the wave shown in figure below. 7



6. (a) Differentiate between the Average value and RMS value of periodic wave in Fourier series representation by using proper equations. 7

(b) Define Fourier Transform. Also explain the Dirichlet's condition of the same. 2+4=6

(c) Obtain the Fourier transform of a two sided exponential function e – at. 7

7. (a) What is known as Z-parameter of two port network ? Explain. 7

(b) What is known as Y-parameter of two port network ? Explain. 6

(c) What is known as H-parameter of two port network ? Explain. 7