Total number of printed pages: **2** **D/3rd Semester/DECE305**

2024

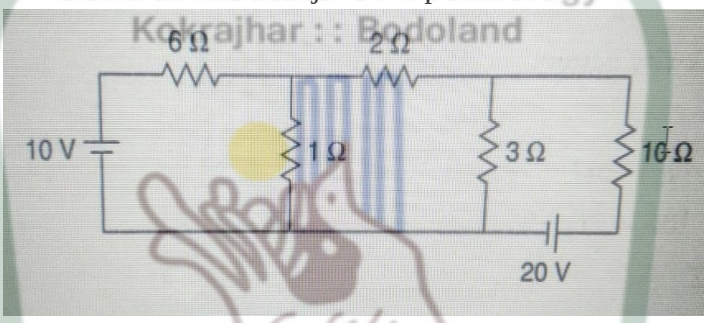
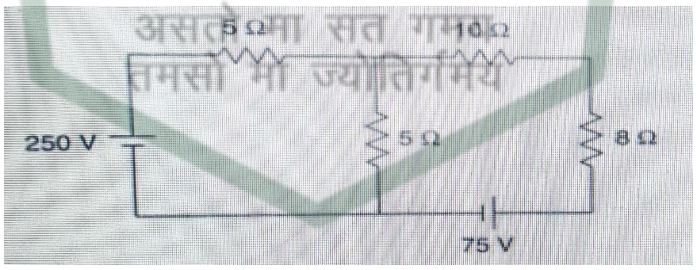
ELECTRIC CIRCUITS AND NETWORK

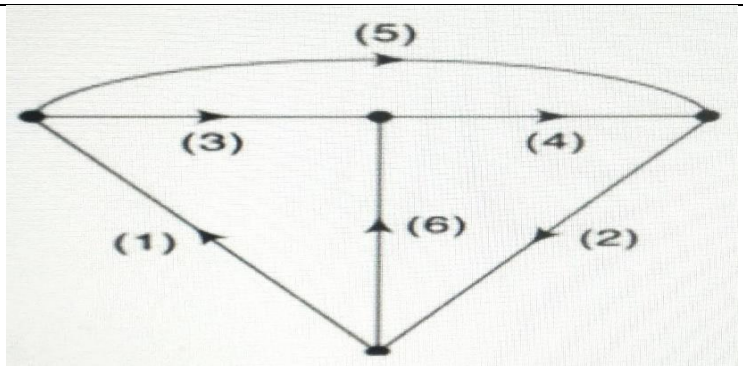
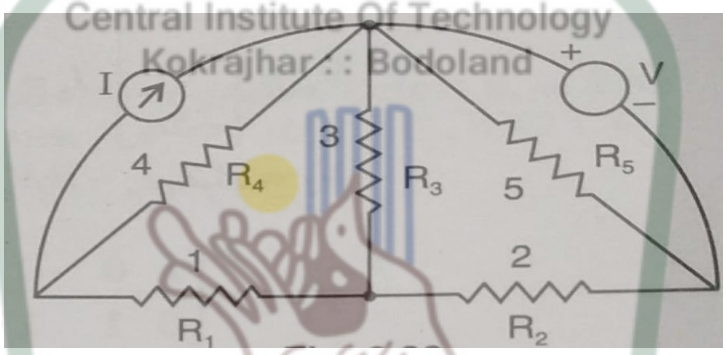
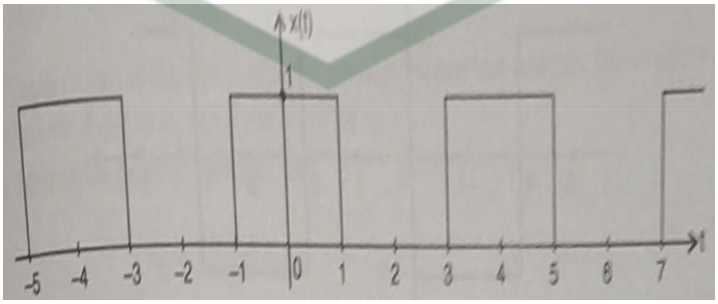
Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1.	a)	Which Kirchhoff's law is used in mesh analysis? In the given circuit diagram, determine the number of junction points and meshes.  Figure-1	1+3=4
	b)	Find the current through 2 Ω resistor as shown in Figure-1 using Mesh analysis.	10
	c)	Find the current through 8 Ω resistor in the network using Thevenin's theorem.  Figure-2	6
2	a)	Explain fundamental cut set matrix with an example.	5
	b)	Find the tie set matrix for the graph shown in Figure-3	7

		 Figure-3	
	c)	For the network shown in the Figure (4), draw network graph. Selecting elements 1,2 and 3 as the tree elements, obtain basic cut-sets and write cut-set matrix.  Figure-4	8
3)	a)	Find the transient responses of series R-L circuit having DC excitation.	7
	b)	Define the various transfer functions of a two-port network. Derive the condition (or result) for series-parallel interconnection of two 2-port networks.	6+7=13
4	a)	Express the Fourier-series coefficients for complex exponential function. Determine the Fourier series coefficients for **x(t)** as shown in Figure-5.  Figure-5	4+8=12
	b)	Express Z-parameters in terms of ABCD parameters.	8
5.	a)	Find the Z and hybrid (h) parameters of the following circuit (Figure-6).	14

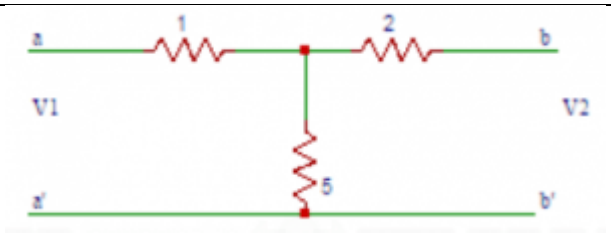
<table>
<tr><td></td><td></td><td> 

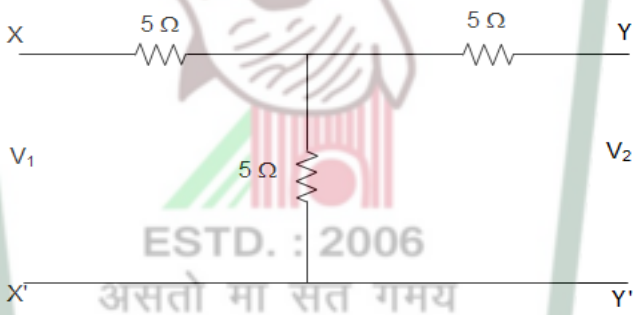
Figure-6</td><td></td></tr>
<tr><td></td><td>b)</td><td>Define open circuit and short circuit impedances parameters.</td><td>6</td></tr>
<tr><td>6.</td><td>a)</td><td>The incidence matrix of a network is given by
<table>
<tr><th>Nodes</th><th colspan="6">Branches</th></tr>
<tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>A</td><td>−1</td><td>+1</td><td>+1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>B</td><td>0</td><td>−1</td><td>0</td><td>−1</td><td>+1</td><td>0</td></tr>
<tr><td>C</td><td>0</td><td>0</td><td>−1</td><td>+1</td><td>0</td><td>+1</td></tr>
<tr><td>D</td><td>+1</td><td>0</td><td>0</td><td>0</td><td>−1</td><td>−1</td></tr>
</table>
Draw the oriented graph.</td><td>6</td></tr>
<tr><td></td><td>b)</td><td>In the circuit given below, find the value of ABCD parameters.


Figure-7</td><td>8</td></tr>
<tr><td></td><td>c)</td><td>Define the following any three terms:
(i) Circuit elements (ii) Branch (iii) Graph (iv) Tree</td><td>2×3=6</td></tr>
</table>