

G. S. Mandal's

Maharashtra Institute of Technology, Aurangabad

(An Autonomous Institute)

END SEMESTER EXAMINATION

Second Year B.Tech (E&C Engg) – Feb/Mar-2023

Course Code: ECE202

Course Name: Network Theory

Duration: 2 Hrs

Max. Marks: 50

Date: 06 Feb 2023

Instructions:

- i) All questions are compulsory
- ii) Assume suitable data wherever necessary and clearly state it
- iii) Figures to right indicate full marks

Q.1 Solve any FIVE

- a. Write the incidence matrix of the graph of Fig. 1 and express branch voltages in terms of node voltages. 2 marks

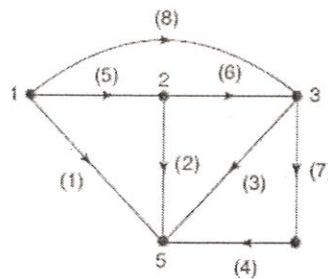


Fig.1

- b. The fundamental cutset matrix of a graph is given as shown in Fig. 2. Express branch voltages in terms of twig voltages. 2 marks

$$Q = \begin{bmatrix} -1 & 1 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 & -1 \\ 1 & 0 & 0 & 1 & 0 \end{bmatrix}$$

Fig.2

- c. The fundamental cutset matrix of a network is given as in Fig. 3. Draw the oriented graph. 2 marks

<i>Twigs</i>			<i>Links</i>		
<i>a</i>	<i>c</i>	<i>e</i>	<i>b</i>	<i>d</i>	<i>f</i>
1	0	0	1	0	1
0	1	0	0	1	1
0	0	1	1	1	1

Fig.3

d. The reduced incidence matrix of an oriented graph is as shown in Fig. 4. Draw the graph.

2 marks

$$A = \begin{bmatrix} 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Fig.4

e. Explain tieset with an example.

2 marks

f. Write a note on possible trees of a graph.

2 marks

g. The incidence matrix is given as in Fig. 5. Draw oriented graph.

2 marks

	Branches →							
	1	2	3	4	5	6	7	8
	-1	-1	0	0	0	0	1	0
	0	1	1	0	1	0	0	0
	0	0	-1	-1	0	1	0	0
	1	0	0	1	0	0	0	1

Fig.5

h. The incidence matrix is given as in Fig. 5. Write tieset matrix.

2 marks

Q. 2 a. Determine the current through the 24 Ω resistor in the network of Fig. 6 by applying

Thevenin's theorem.

4 marks

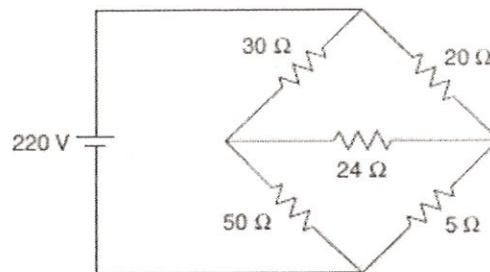


Fig.6

b. Find the current through the 10 Ω resistor in network of Fig. 7 using Norton's theorem.

4 marks

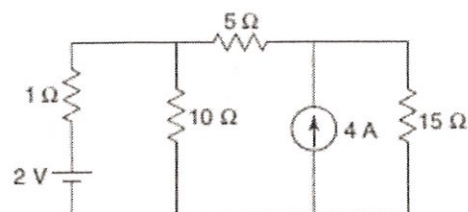


Fig.7

Q. 3. a. Write a short note on series and parallel resonant circuits and their bandwidth.

4 marks

b. Classify and define the types of filters.

4 marks

Q. 4 a. Find the open-circuit impedance parameters for the network shown in Fig. 8. Determine whether the network is symmetrical and reciprocal. **4 marks**

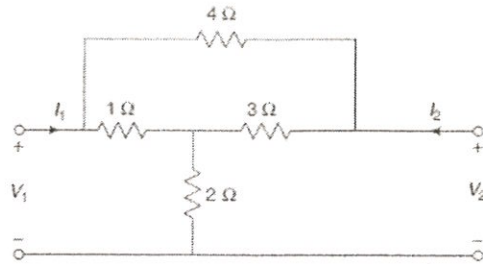


Fig.8

b. Find the value of load impedance Z_L so that maximum power can be transferred to it in the network of Fig. 9. Find maximum power. **4 marks**

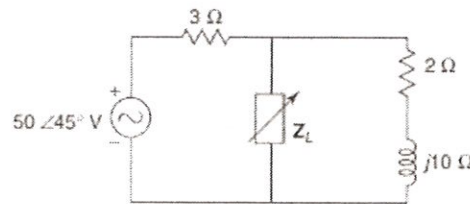


Fig.9

Q.5 a. Find Y-parameters of the network shown in Fig.10. **4 marks**

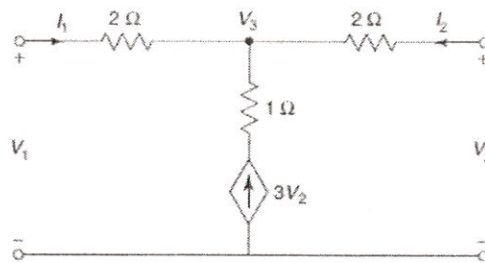


Fig.10

b. What are ABCD parameters? What is the condition for symmetry and reciprocity in terms of ABCD parameters? **4 marks**

Q. 6 a. Write a note on T –type and π – type attenuator. **4 marks**

b. Explain full series and full shunt equalizer. **4 marks**

