



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Third Semester, B.E. - Electronics and Communication Engineering

Make-up Examination; Jan / Feb - 2017

Electrical Network Analysis

Time: 3 hrs

Max. Marks: 100

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.
ii) Missing data may be suitably assumed

UNIT - I

1 a. Define the following :

- i) Active component 8
- ii) Passive component
- iii) Constant voltage source
- iv) Constant current source.

b. State and explain with an example Kirchoff's Voltage law. 8

c. Differentiate mesh and node analyses with suitable examples. 4

2 a. Write the mesh equation for the circuit shown in Fig. 1 and determine mesh currents using mesh analysis.

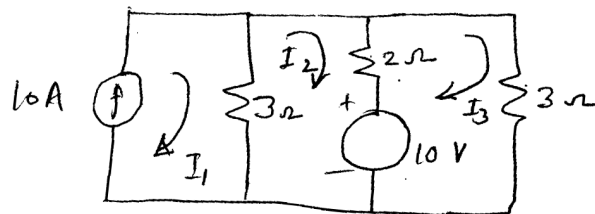


Fig. 1. Q 2(a)

b. In the circuit shown in Fig. 2, determine V_2 which results is zero current through $4\ \Omega$ resistor. Use mesh current analysis.

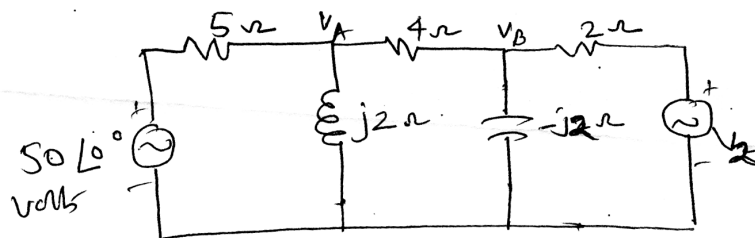


Fig 2. Q 2(b)

UNIT - II

3 a. Define the following with examples :

- i) Planar and Non-Planar groups 8
- ii) Twigs and Links.

b. Explain with an example, incidence matrix of a network graph. 8

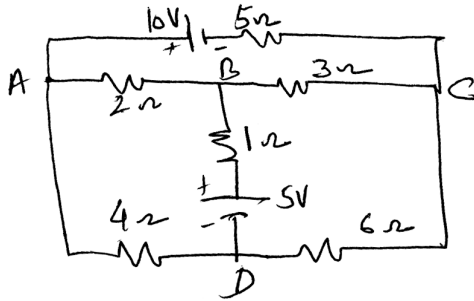
c. Explain with examples, the principle of duality. 4

4 a. Define the following with examples :

- i) Oriented graphs
- ii) Cut set
- iii) Tie set.

6

b. Draw the oriented graph of the matrix shown in Fig. 3 and select a tree, write the tie set schedule and obtain equilibrium equation.



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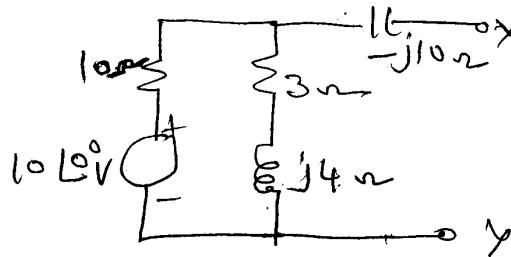
Fig 3. Q 4(b)

UNIT - III

5 a. State and explain Thevenin's theorem as applied to AC circuits.

8

b. Obtain the Thevenin's equivalence of network shown in Fig. 4. Between the terminals X and Y.



8

Fig 4 Q 5(b)

c. State and explain reciprocity theorem with an example.

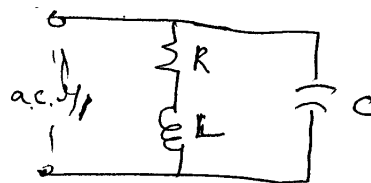
4

6 a. Show that the resonant frequency in the geometric mean of two half power frequencies

10

$$f_0 = \sqrt{f_1 f_2}, \text{ where } f_1 \text{ and } f_2 \text{ are two half power frequencies and } f_0 \text{ is the resonant frequency.}$$

b. For the circuit shown in Fig. 5 determine the value of capacitance and coil resistance at resonant frequency of 500 rad / sec.



$$L = 0.1 \text{ H}$$

$$Q = 5$$

10

Fig 5 Q 6(b)

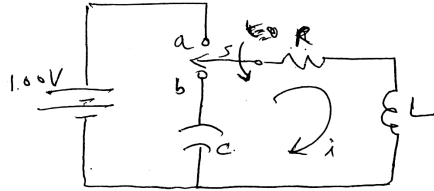
UNIT - IV

7 a. Describe the importance of the study of initial conditions in a network. Write the equivalent form of the elements R, L and C under initial conditions.

8

b. In the circuit shown in Fig. 6 the switch is moved from *a* to *b* at $t = 0$. Find the values of i ,

$\frac{di}{dt}, \frac{d^2i}{dt^2}$ at $t = 0^+$, if $R = 1 \Omega$, $L = 1 \text{ H}$ and $C = 0.1 \mu\text{F}$ and $V = 100 \text{ V}$.



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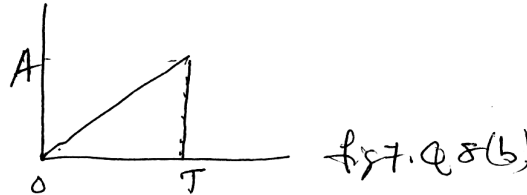
Fig 6 Q 8(b)

8 a. Find the Laplace transform of :

- i) $\delta(t)$
- ii) t
- iii) e^{-at}
- iv) $\sin at$.

8

b. Obtain the Laplace transform of the waveform shown in Fig. 7.



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Fig 7. Q 8(b)

c. State initial value and final value theorems.

4

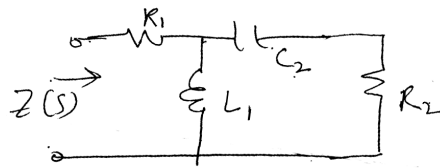
UNIT - V

9 a. Explain the importance of poles and zeros of network functions with a suitable example.

10

b. For the network shown in Fig. 8 write the driving point impedance $Z(s)$. Also plot the pole and zeros on the S plane.

Assume $R_1 = R_2 = 1 \Omega$, $L_1 = 0.5 \text{ H}$, $C_2 = 0.5 \text{ F}$.



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Fig 8 Q 9(b)

10 a. Define 'Z' parameter of a two port network.

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b. Find the y parameter for the circuit shown in Fig. 9.

8

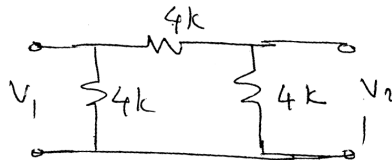


Fig 9 Q 10(b)

c. What are transmission parameters? What is their importance?

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