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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 ii) Passive component 8

iii) Constant voltage source iv) Constant current source.

b. State and explain with an example Kirchhoff'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.

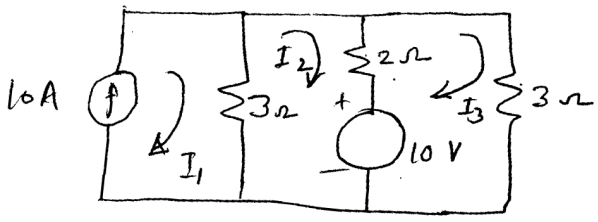


Fig 1. Q 2(a) 10

b. In the circuit shown in Fig. 2, determine V_2 which results is zero current through 4 Ω resister. Use mesh current analysis.

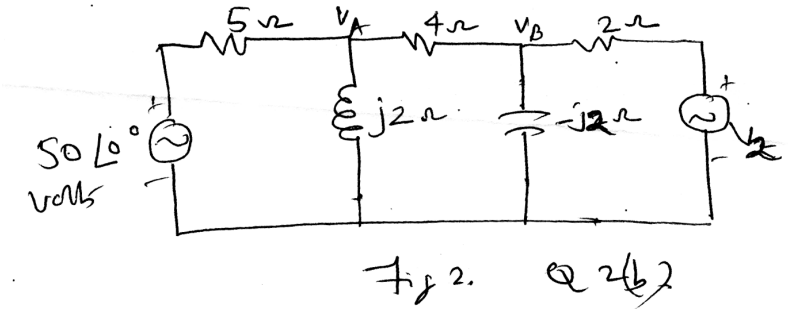


Fig 2. Q 2(b) 10

UNIT - II

3 a. Define the following with examples :

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

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

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

Contd.....2

4 a. Define the following with examples : 6

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

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. 14

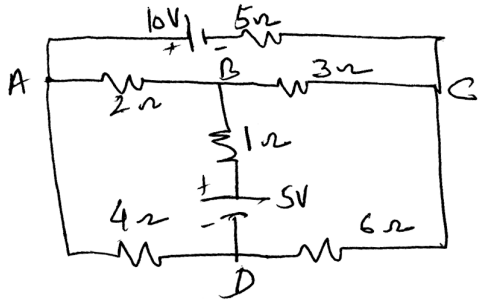


Fig 3. Q 4(b)

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

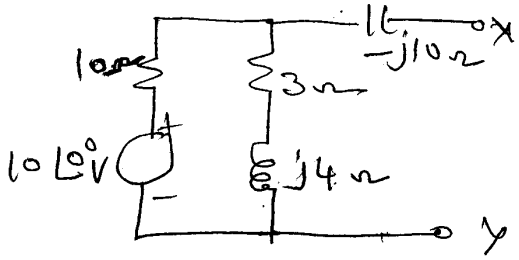
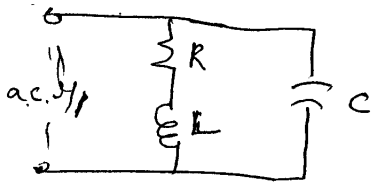


Fig 4 Q 5.(b)

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 $f_0 = \sqrt{f_1 f_2}$, where f_1 and f_2 are two half power frequencies and f_0 is the resonant frequency. 10

b. For the circuit shown in Fig. 5 determine the value of capacitance and coil resistance at resonant frequency of 500 rad / sec. 10



L = 0.1 H
Q = 5

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

Contd.....3

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 Ω, L = 1 H and C = 0.1 μF and V = 100 V. 12

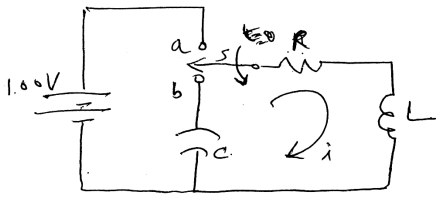


Fig 6 Q 7(b)

8 a. Find the Laplace transform of : 8

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

b. Obtain the Laplace transform of the waveform shown in Fig. 7. 8

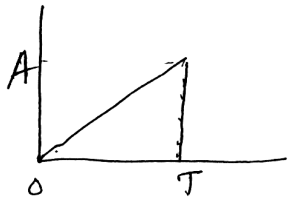


Fig 7. Q 8(b)

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 $R_1 = R_2 = 1\ \Omega$, $L_1 = 0.5$ H, $C_2 = 0.5$ F. 10

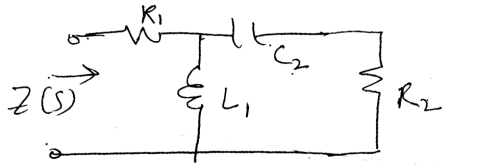


Fig 8 Q 9(b)

10 a. Define 'Z' parameter of a two port network. 8

b. Find the *y* parameter for the circuit shown in Fig. 9. 8

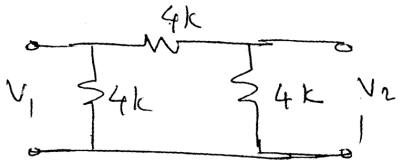


Fig 9 Q 10(b)

c. What are transmission parameters? What is their importance? 4

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