

Seat No.	
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**[4757]-1044**

S.E. (Electronics &amp; E &amp; TC) (First Semester)

EXAMINATION, 2015

NETWORK THEORY

(2012 Pattern)

Time : Two Hours

Maximum Marks : 50

**N.B.** :— (i) Neat diagrams must be drawn wherever necessary.

(ii) Figures to the right indicate full marks.

(iii) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(iv) Assume suitable data, if necessary.

1. (a) Obtain Thevenin and Norton equivalent circuits for the network shown in fig. 1. [6]

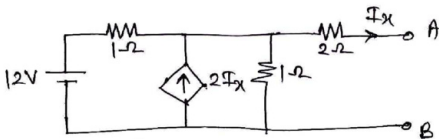


Fig. 1

- (b) For the graph and tree given in Fig. 2. find complete incidence matrix, tiset matrix and F-cutset matrix : [6]

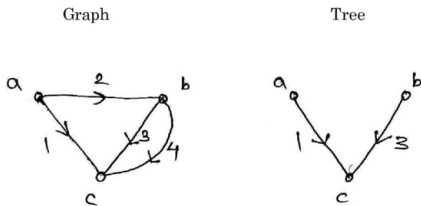


Fig. 2

Or

2. (a) For the network shown in Fig. 3, determine the current  $I_2$  using superposition theorem. [6]

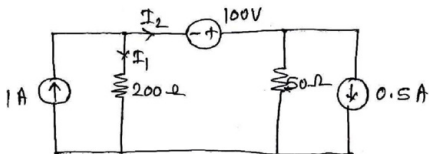


Fig. 3

- (b) For the given incidence matrix, draw oriented graph and determine number of possible trees. [6]

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

3. (a) Find the expression for  $V_c(t)$  in the network shown in Fig. 4. [6]

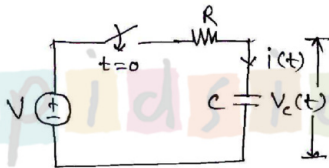


Fig. 4

- (b) A series resonant circuit consists of  $R = 10 \Omega$ ,  $L = 100 \text{ mH}$  and  $C = 10 \text{ nF}$ . Find resonant frequency  $\omega_r$ ,  $F_r$ , quality factor  $Q_r$  at resonant frequency, bandwidth. Also find current flowing through circuit at resonance if the applied voltage is 100 V. [6]

Or

4. (a) For the network shown in Fig. 5, obtain the expression for  $i_L(t)$ . [6]

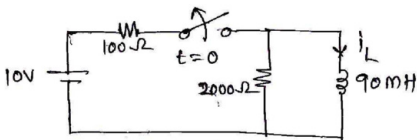


Fig. 5

- (b) A parallel resonant circuit has a coil of  $100 \mu\text{H}$  with  $Q$  factor of 100 and is resonated at 1 MHz. Find : [6]
- (i) Capacitance
  - (ii) Resistance of coil
  - (iii) Bandwidth
  - (iv) Impedance at parallel resonance
5. (a) A Pi-section constant K filter consists of series arm inductance of 20 mH and two shunt arm capacitors of  $0.1 \mu\text{F}$  each. Calculate cut-off frequency, attenuation at 1.5 kHz. Also find nominal impedance  $Z_\pi$  at  $f = 0$  and  $f = f_c$ . [7]

- (b) For a T-section symmetrical network derive the expression for  $Z_{OC}$ ,  $Z_{SC}$  and characteristic impedance  $Z_0$ . [6]

Or

6. (a) For the system with  $500 \Omega$  resistance design T and Pi attenuators to have 100 dB attenuation. Also draw T and Pi attenuators showing the designed component values. [7]
- (b) Draw the T section and Pi section constant K Band pass filter circuits and write equations for components in series arm and shunt arm. [6]
7. (a) Explain different network functions for one port and two port networks. [7]
- (b) Determine Z parameters for the network shown in Fig. 6. [6]

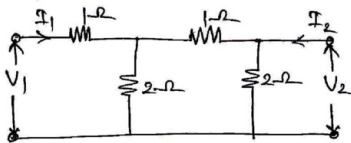


Fig. 6

Or

8. (a) Determine the impedance function  $Z(s)$  for the network shown Fig. 7. Also draw its pole zero plot. [7]

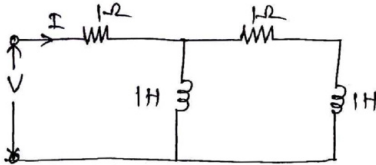


Fig. 7

- (b) Determine Y parameters of the network shown in Fig. 8. [6]

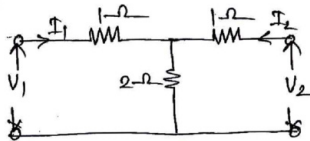


Fig. 8