Total No. of Questions—**8**] [Total No. of Printed Pages—**4+2**

Seat No.	

[4757]-1044

S.E. (Electronics & E & 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]

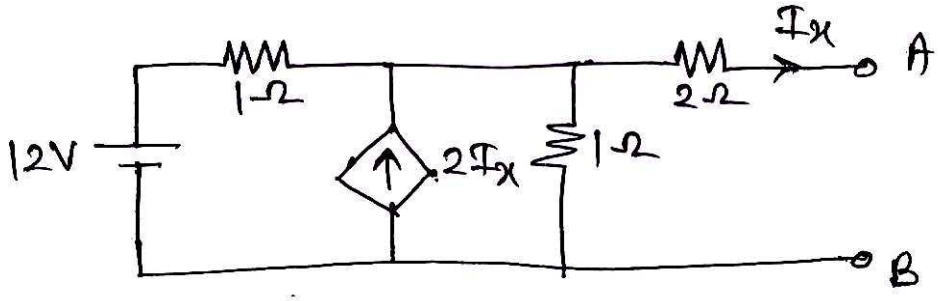

Fig. 1

P.T.O.

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

Graph Tree

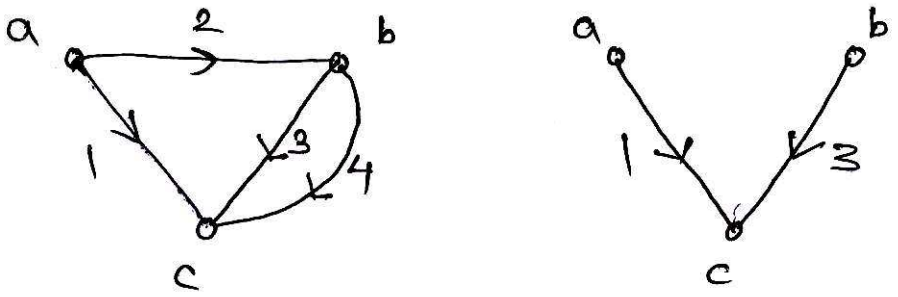

Fig. 2

Or

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

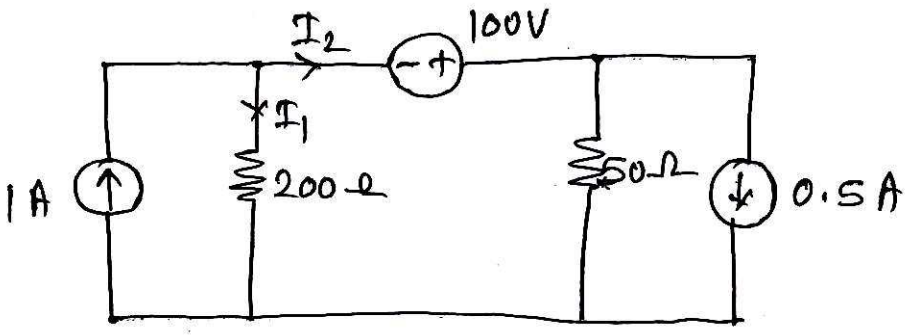

Fig. 3

(*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]

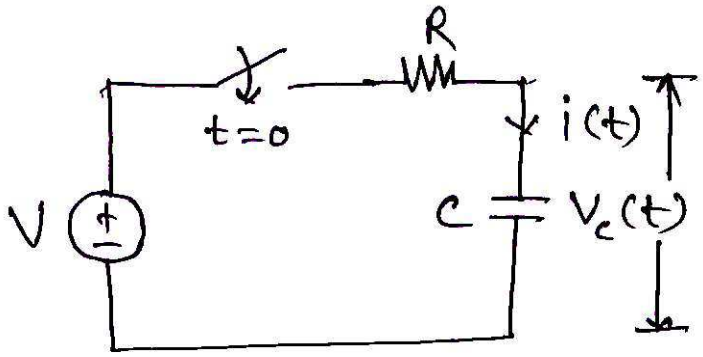

Fig. 4

(*b*) A series resonant circuit consists of R = 10 Ω, L = 100 mH and C = 10 nF. Find resonant frequency ω_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]

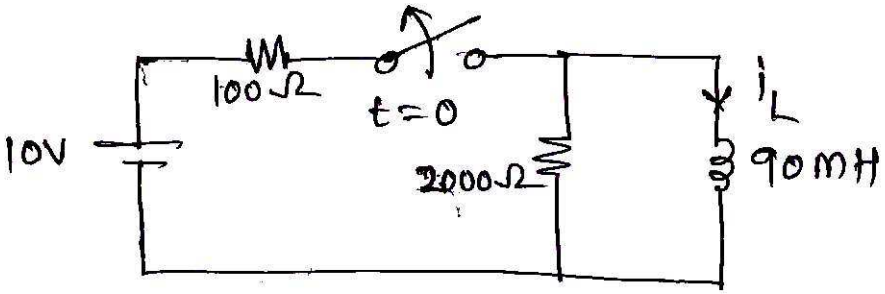

Fig. 5

(*b*) A parallel resonant circuit has a coil of 100 μH 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 μF each. Calculate cut-off frequency, attenuation at 1.5 kHz. Also find nominal impedance Z_π 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_o. [6]

Or

6. (*a*) For the system with 500 Ω 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 contant 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]

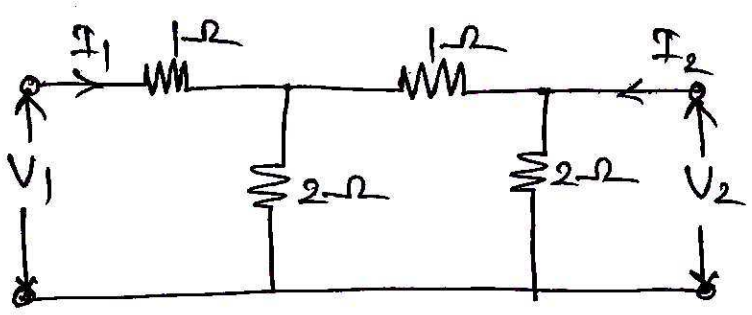

Fig. 6

Or

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

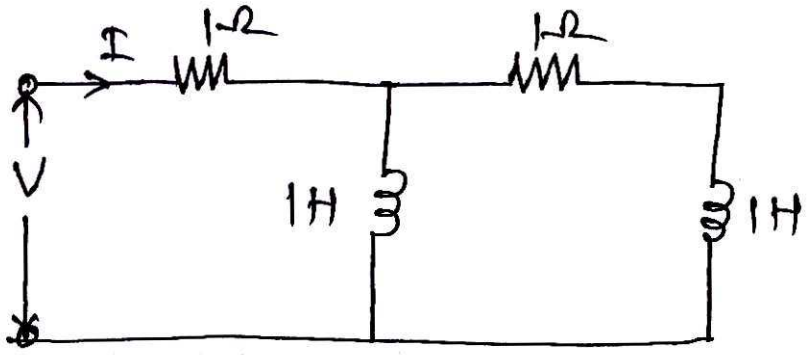

Fig. 7

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

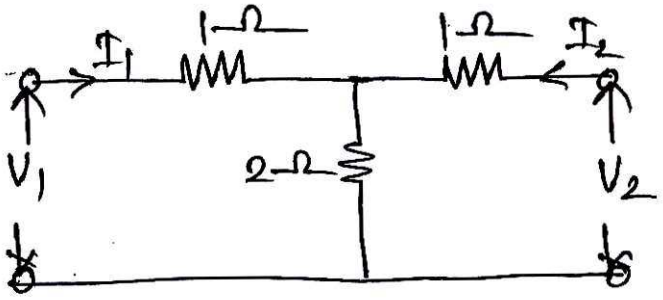

Fig. 8