Total No. of Questions—**8**] [Total No. of Printed Pages—**5**

Seat No.	

[5252]-133

S.E. (E&TC/Electronics) (I Semester) EXAMINATION, 2017

NETWORK THEORY

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Answer Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6**, Q. **7** or Q. **8**.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Assume suitable data if necessary.

(*v*) Use of non-programmable calculator is permitted.

1. (*a*) Determine V*x* in the circuit of Fig. 1, using Kirchhoff's laws. [6]

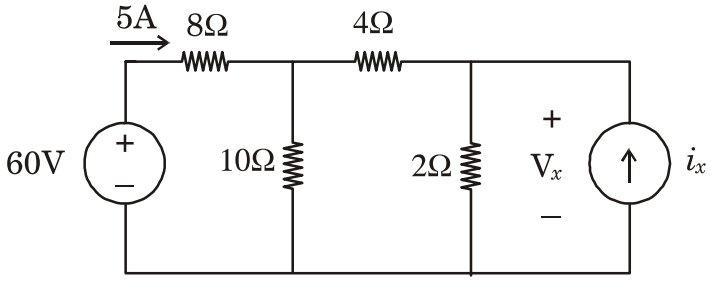

Fig 1.

(*b*) Draw the dual of the network shown in Fig. 2. [6]

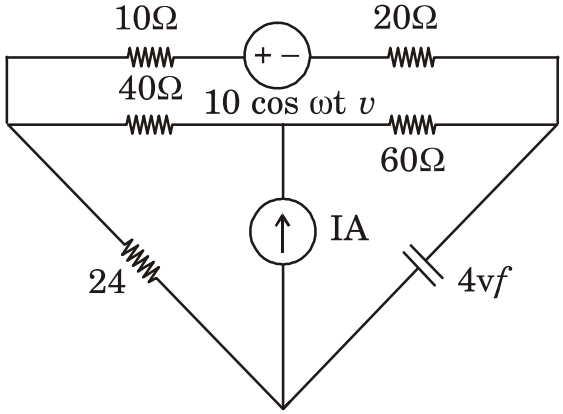

Fig.2

P.T.O.

Or

2. (*a*) Determine the Thevenin equivalent of the network shown in Fig 3. [6]

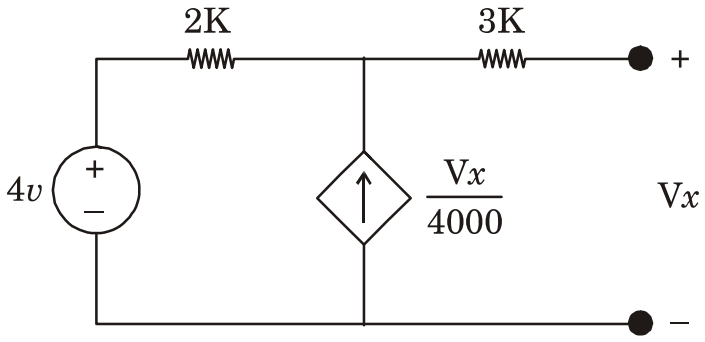

Fig. 3

(*b*) For the oriented graph shown in Fig. 4. Determine the Tieset matrix and *f*-cutset matrix. [6]

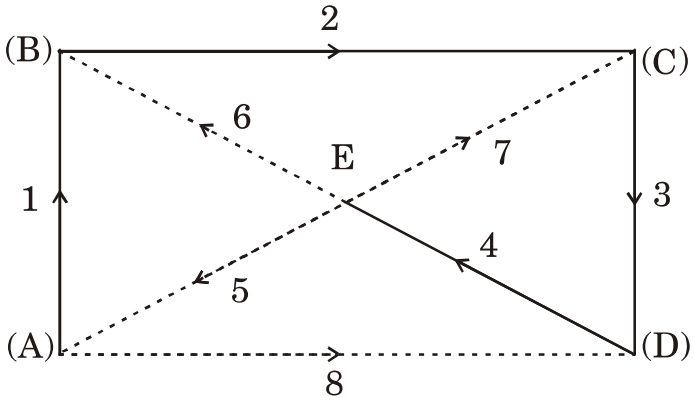

Fig. 4

3. (*a*) The switch is opened at $t = 0$ for the network shown in Fig. 5, Find voltage labeled V at $t = 200$ ms and also plot V(t).[6]

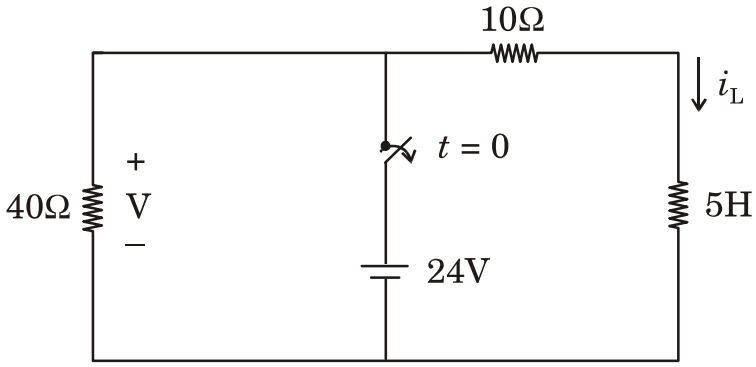

Fig. 5

(*b*) A series RLC circuit consists of R = 100 Ω, L = 0.02 H and C = 0.02 μ*f*. Calculate frequency of resonance. Calculate voltage across L and C at frequency of resonance. Also find maximum current in the circuit. [6]

Or

4. (*a*) In the circuit shown in Fig. 6, the switch is changed from position 1 to 2 at $t = 0$. Determine initial conditions of i, di/dt, d^2i/dt^2 at $t = 0^+$. [6]

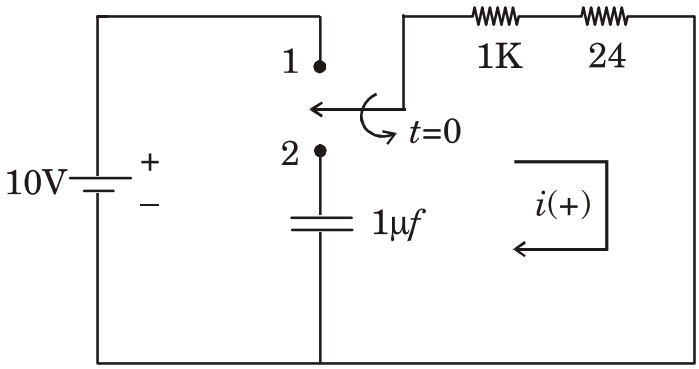

Fig.6

(*b*) Explain the variation of voltage across R, L and C on graph with frequency at resonance. Also write the equation of frequencies at which voltage across C and L are miximum. [6]

5. (*a*) If the measurements made on a box enclosing a two-port network are $Z_{loc} = 40 \angle 0^\circ\ \Omega$, $Z_{lsc} = 22.3 \angle 29.8^\circ\ \Omega$. Find the values of characteristic impedance and propagation constant along with attenuation constant and phase constant, if the network is symmetrical. [7]

(*b*) Design a constant *k* high pass π section filter to have a design impedance of 600 Ω. The filter must have attenuation of 8.11 dB at 4.5 KHz. Also calculate phase angle at $f = 5.5$ kHz. [6]

Or

6. (*a*) Design *m*-derived T section LPF having cutoff frequency of 5 KHz and impedance of 600 Ω. The frequency of infinite attenuation is 1.25 times the cutoff frequency. [7]

(*b*) Define attenuation in Neper and Decibel. Derive the relationship between Neper and Decibel. [6]

7. (*a*) Find Z parameters for the network shown in Fig. 7 [6]

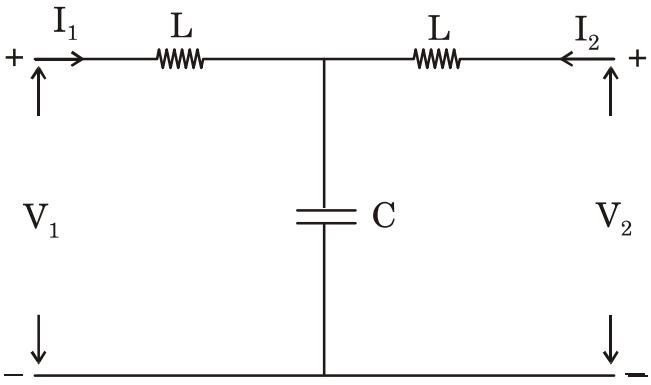

Fig. 7

(*b*) Find the driving point admittance Y(s) for the network shown in Fig.8. Also plot pole zero diagram. [7]

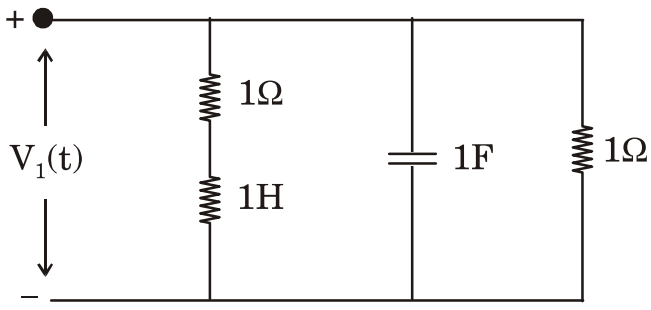

Fig. 8

Or

8. (*a*) Define symmetrical network. Derive expression for condition of symmetry for T parameter. [6]

(*b*) Determine hybrid parameters for the network shown in Fig. 9. [7]

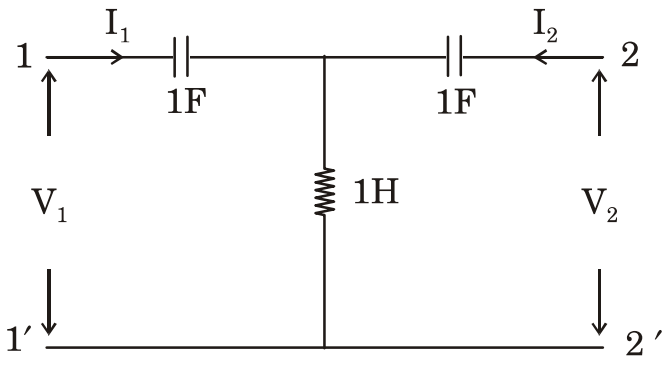

Fig. 9