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

Seat No.	

[5559]-135

S.E. (E&TC/Electronics) (I Sem.) EXAMINATION, 2019

NETWORK THEORY

(2012 PATTERN)

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

N.B. **:—** (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

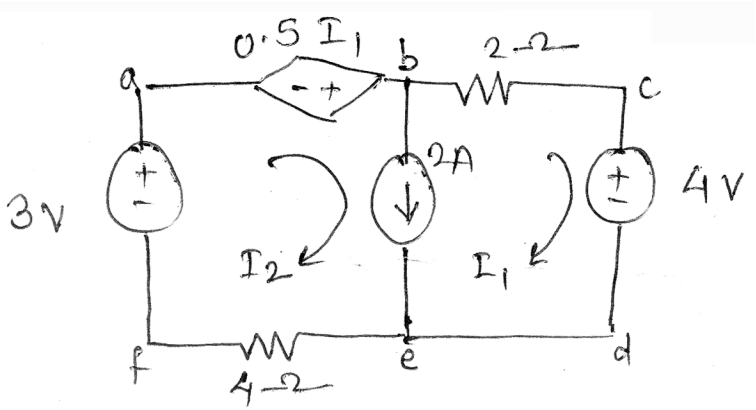
(*ii*) Figures to the right indicate full marks.

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

(*iv*) Use of non-programmable electronic pocket calculator is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Determine I_1 in the circuit shown in Fig. using Kirchhoff's laws. [6]



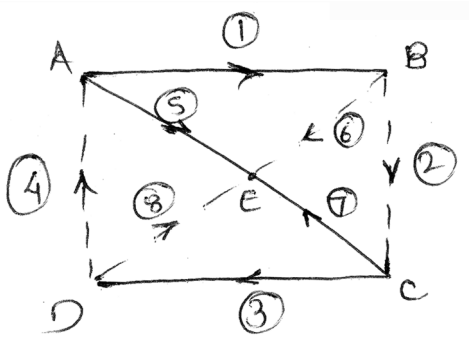
P.T.O.

(*b*) For the given figure shown by firm lines as tree including branches 1, 5, 7, 3 find : [6]

(*i*) Incidence matrix

(*ii*) Fundamental cutset matrix

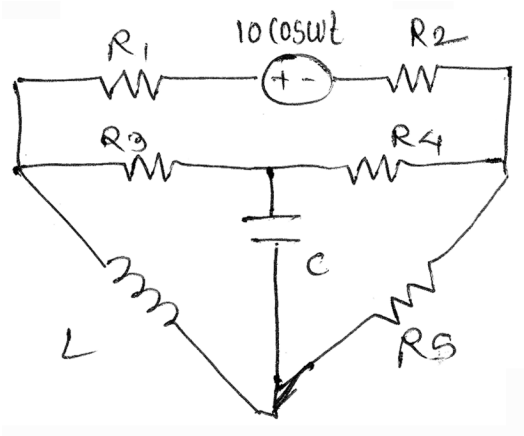
(*iii*) Fundamental tieset matrix.



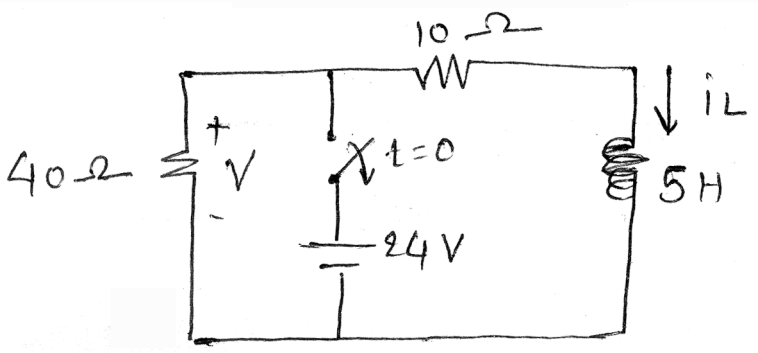
Or

2. (*a*) State and explain maximum power transfer theorem in detail. [6]

(*b*) Draw dual of network shown. [6]



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



(*b*) An inductive coil having resistance of 50 Ω and an inductance of 0.05 H is connected in series with 0.02 μF capacitor. Find : [6]

(*i*) Q factor of coil

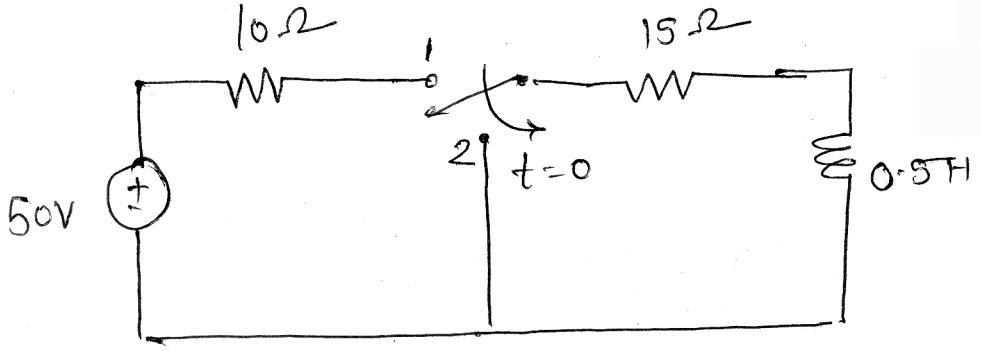
(*ii*) Resonant frequency

(*iii*) Half power frequency.

Or

4. (*a*) Prove that resonant frequency is the geometric mean of two half power frequencies. [6]

(*b*) For the circuit shown in Fig. the switch '*s*' is at position '1' and steady state condition is reached. The switch is moved to position '2' at t = 0. Find the current in both cases i.e. with switch at position '1' and switch at position '2'. [6]



5. (*a*) A symmetrical T network is composed of pure resistances of the following values at open and short circuit impedance :

$$Z_{0C} = 800\ \Omega\ \angle 0°$$

$$Z_{5C} = 600\ \Omega\ \angle 0°$$

Determine characteristic impedance Z_0, Z_1 and Z_2 for the T network. [6]

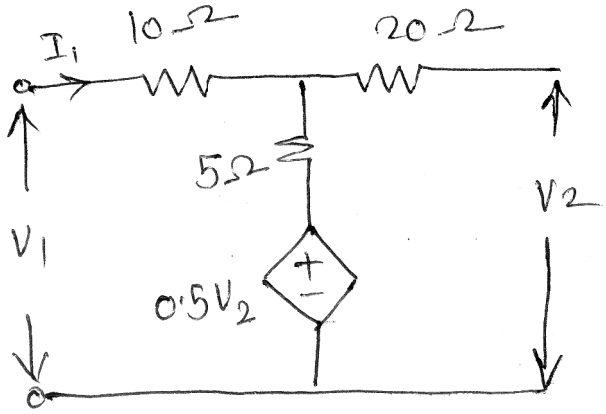
(*b*) Design a constant K LPF with f_c = 1 kHz and R_0 = 600 Ω. At what frequency α will be 10 dB ? [7]

Or

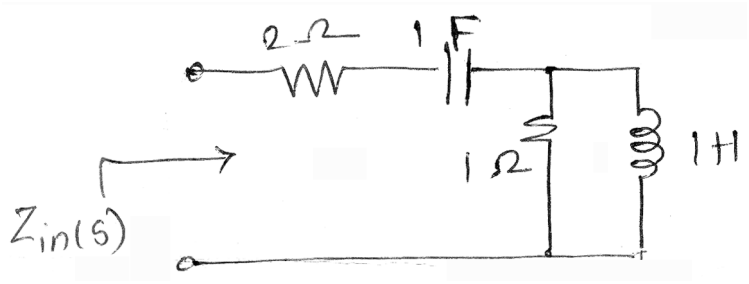
6. (*a*) Define attenuation in Neper and Decibel. Derive the relationship between Neper and Decibel. [6]

(*b*) Design a suitable matching half section to match a symmetrical T network with Z_{0T} = 500 Ω to a generator having an internal resistance equal to 200 Ω ? [7]

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

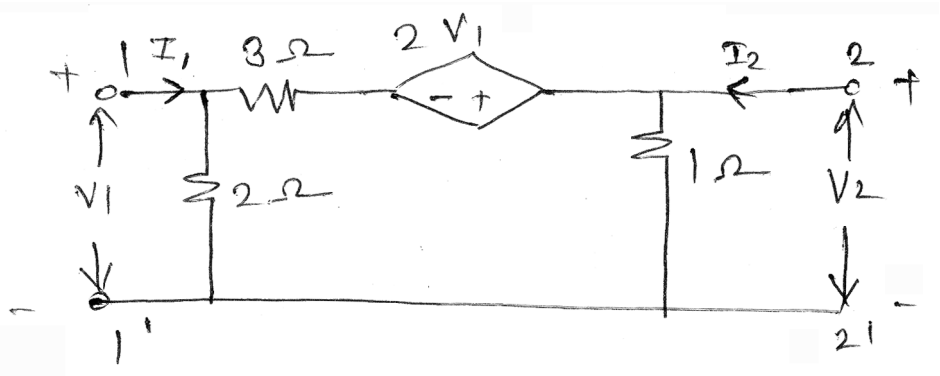


(*b*) Find input impedance $Z_{in}(s)$ and plot its poles and zeros for the circuit shown in Fig. [7]



Or

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



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