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.

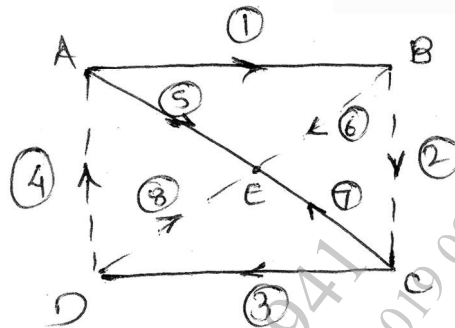　　　　(*v*)　Assume suitable data, if necessary.

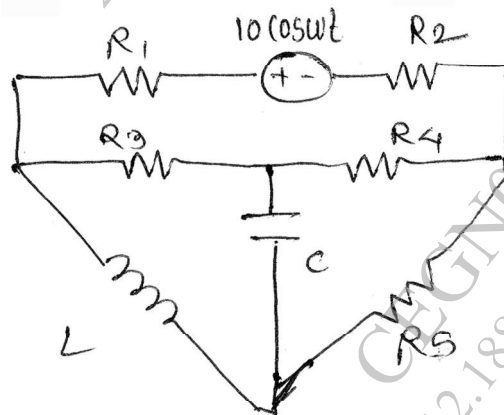**1.**　(*a*)　Determine I_1 in the circuit shown in Fig. using Kirchhoff's laws.　[6]

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

(i)   Incidence matrix

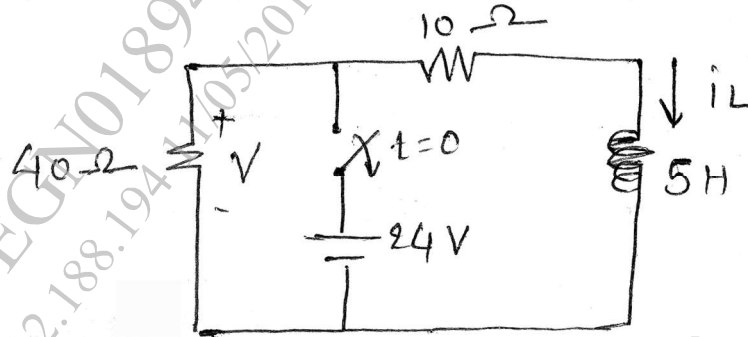(ii)   Fundamental cutset matrix

(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]
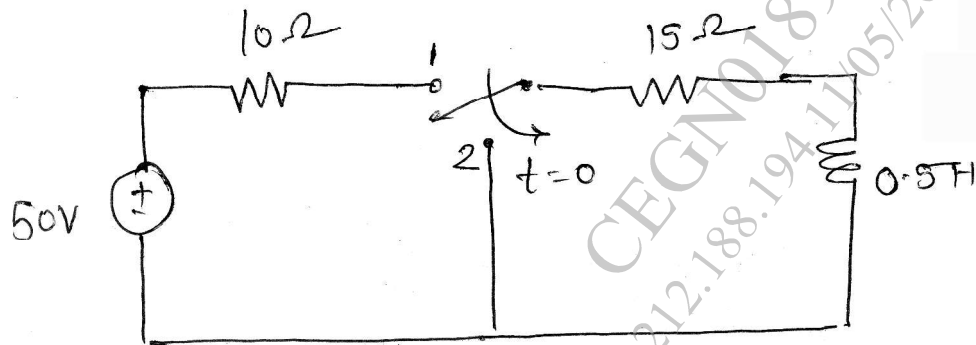

(b) An inductive coil having resistance of 50 Ω and an inductance of 0.05 H is connected in series with 0.02 μF capacitor. Find : [6]

(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 :

$$Z_{0C} = 800 \ \Omega \ \angle 0°$$

$$Z_{5C} = 600 \ \Omega \ \angle 0°$$

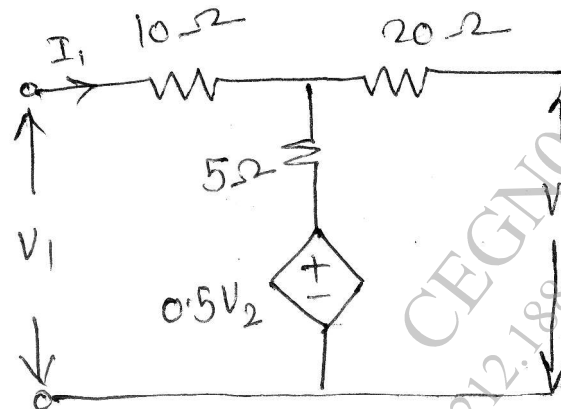Determine characteristic impedance Z_0, Z_1 and Z_2 for the T network. [6]

(*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]
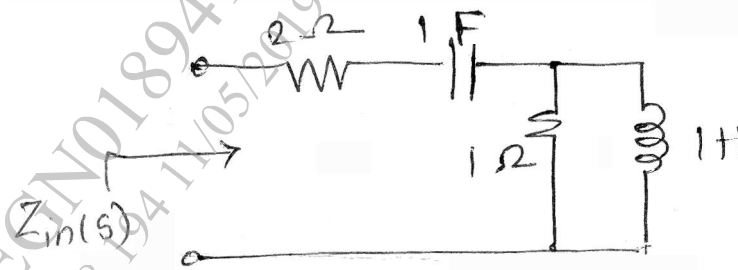
Or

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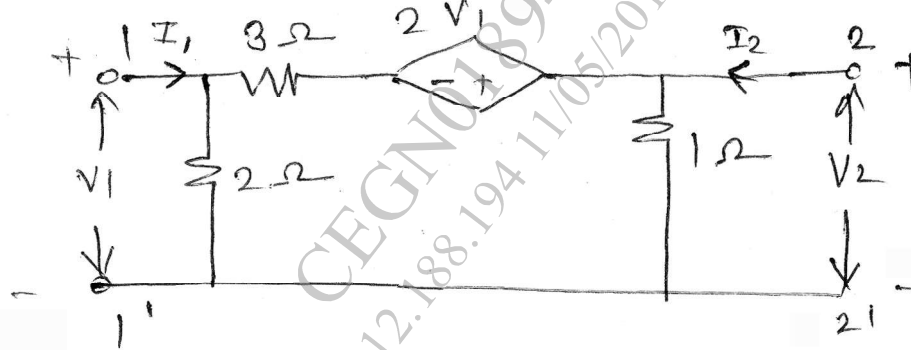
(*b*)   Find input impedance $Z_{in}(s)$ and plot its poles and zeros for the circuit shown in Fig.   [7]

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]