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[5559]-135

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

NETWORK THEORY

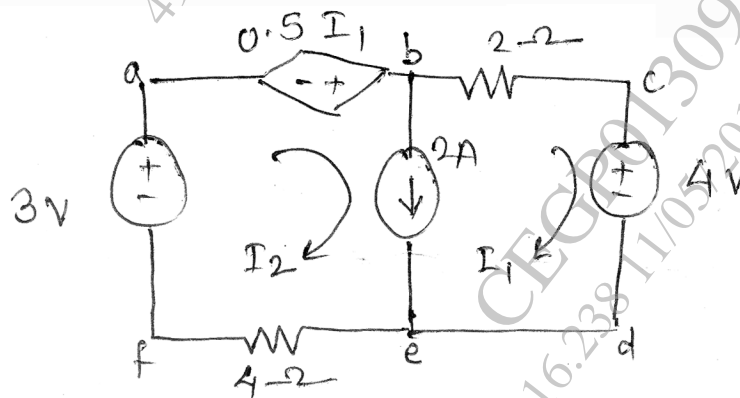
(2012 PATTERN)

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.

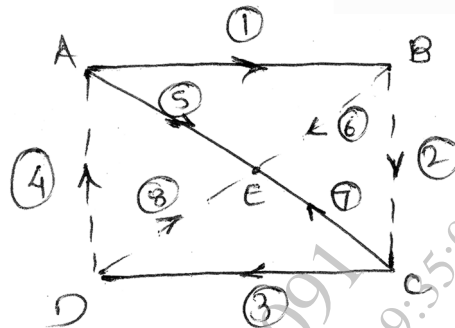
1. (a) Determine I_1 in the circuit shown in Fig. using Kirchhoff's laws. [6]



P.T.O.

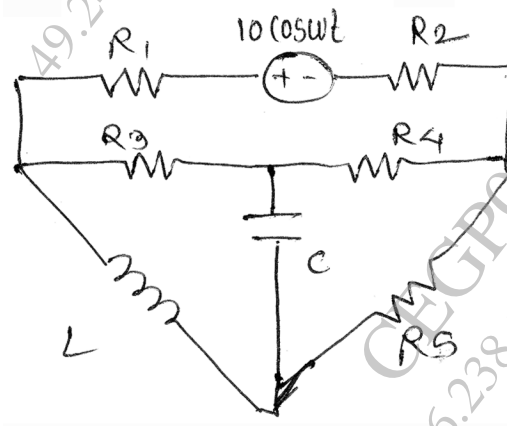
(b) For the given figure shown by firm lines as tree including branches 1, 5, 7, 3 find : [6]

- (i) Incidence matrix
- (ii) Fundamental cutset matrix
- (iii) Fundamental tieset matrix.

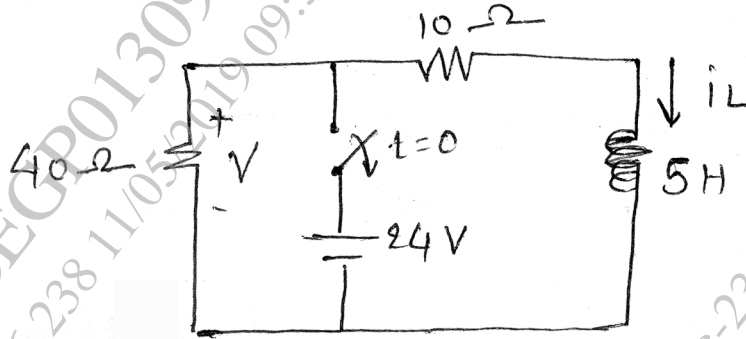


Or

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]

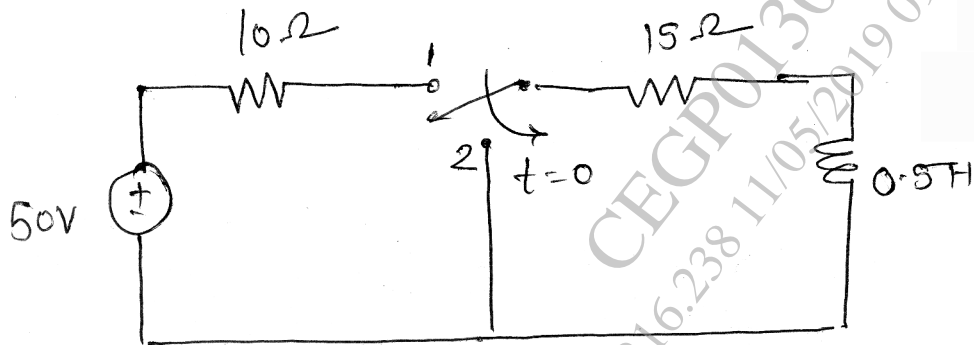


- (b) An inductive coil having resistance of 50Ω and an inductance of 0.05 H is connected in series with $0.02 \mu\text{F}$ capacitor. Find : [6]

- Q factor of coil
- Resonant frequency
- 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 :

$$Z_{0C} = 800 \, \Omega \angle 0^\circ$$

$$Z_{5C} = 600 \, \Omega \angle 0^\circ$$

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

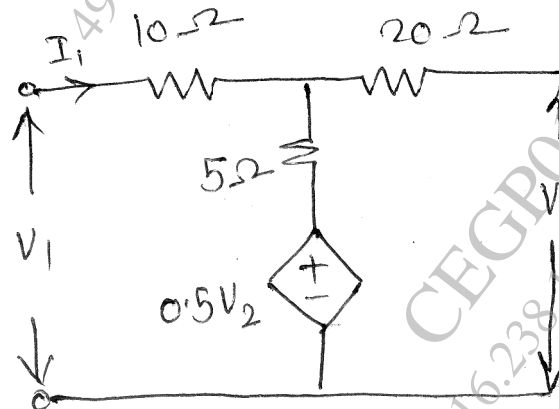
- (b) Design a constant K LPF with $f_c = 1 \text{ kHz}$ and $R_0 = 600 \, \Omega$. At what frequency α will be 10 dB ? [7]

Or

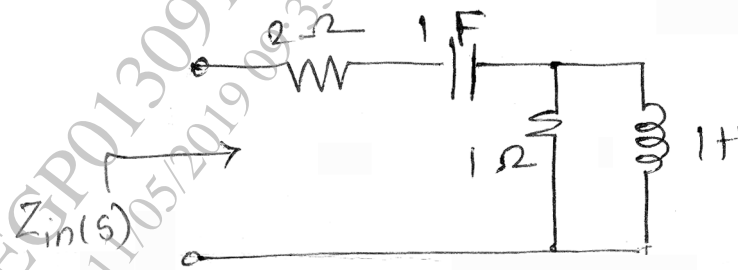
6. (a) Define attenuation in Neper and Decibel. Derive the relationship between Neper and Decibel. [6]

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

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

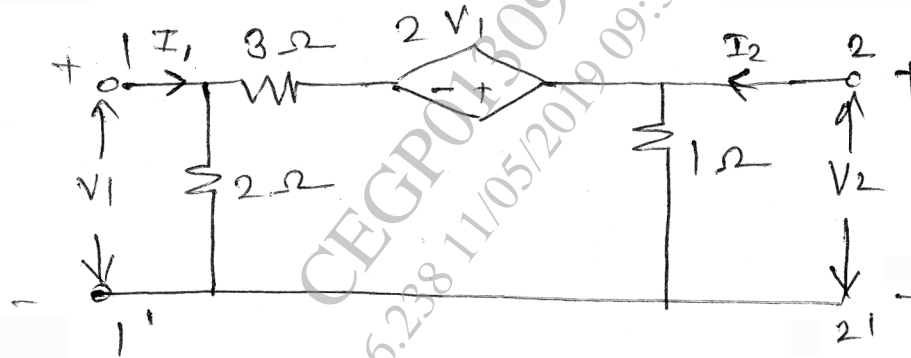


- (b) Find input impedance $Z_{in}(s)$ and plot its poles and zeros for the circuit shown in Fig. [7]



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]