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

| **Seat No.** | |
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# [5352]-133

## S.E. (E&TC/ELECTRONICS) (I Sem.) EXAMINATION, 2018

## NETWORK THEORY

## (2012 PATTERN)

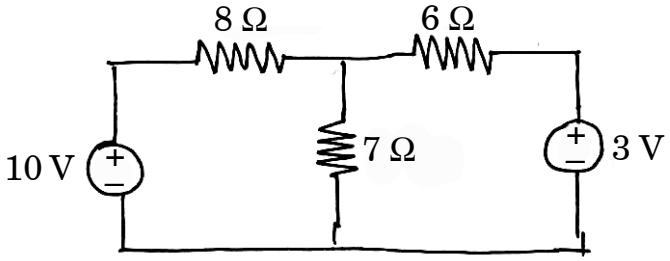
**Time : Two Hours** **Maximum Marks : 50**

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

**1.** (*a*) For the network shown below, find current through 7 Ω resistor using superposition theorem. [6]




(*b*) Explain the following terms with example : [6]

(*i*) Oriented graph

(*ii*) Rank of graph

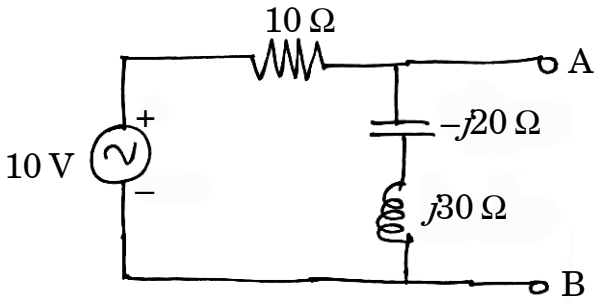
(*iii*) CoTree

(*iv*) Twig.

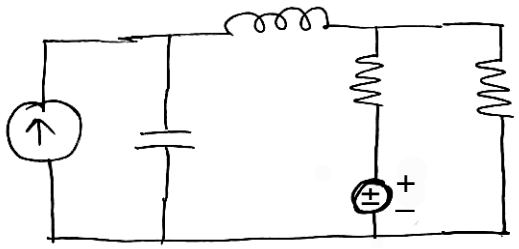
P.T.O.

*Or*

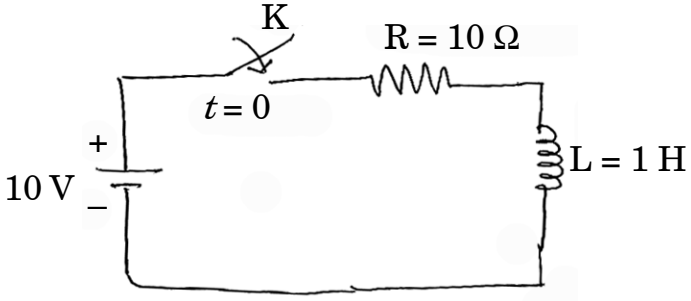
**2.** (*a*) Obtain Thevenin's equivalent circuit w.r.t. points A & B for the circuit below : [6]




(*b*) Find the maximum possible number of trees for the network shown in Fig. [6]



**3.** (*a*) The switch is closed at $t = 0$. Find value of $i$, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$. Assume initial current of inductor to be zero. [6]



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

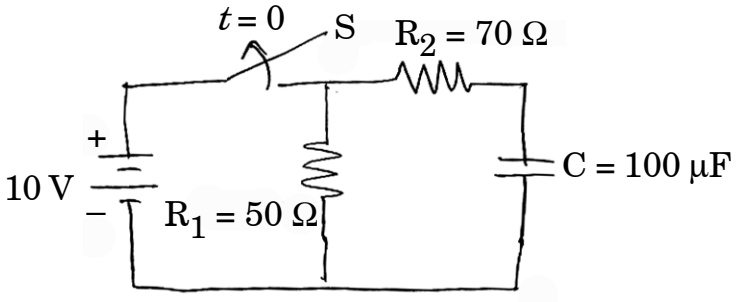
(*i*) Q factor of coil

(*ii*) Resonant frequency

(*iii*) Half power frequency.

*Or*

**4.** (*a*) In Fig., the switch 'S' is opened at $t = 0$. Find the expression for voltage across C for $t > 0$. Also find voltage at $t = 0.036$ sec. [6]




(*b*) Define Q-factor and derive equations for Q-factor of L&C. [6]

**5.** (*a*) For any symmetrical network, prove that the characteristic impedance $z_0$ is the geometric mean of open and short circuit impedances. [6]

(*b*) Design constant K-HPF having cut-off frequency 5500 Hz and design impedance of 750 Ω. Draw : [7]

(*i*) T-section

(*ii*) π-section.

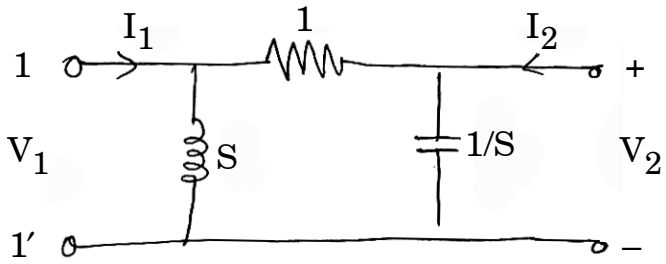
*Or*

**6.** (*a*) Design a symmetrical π attenuator to work into 600 Ω and provide a loss of 20 dB. [6]

(*b*) What are the limitations of prototype filters ? How these limitations are overcomed using *m*-derived filters ? Explain composite filters with its block diagram. [7]

**7.** (*a*) Derive the condition of reciprocity and symmetry for *z* parameters. [6]

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




*Or*

**8.** (*a*) Current $I_1$ and $I_2$ entering at port 1 and port 2 respective of two port network are given by the following equations :

$$I_1 = 0.5V_1 - 0.2V_2$$

$$I_2 = 0.2V_1 + V_2.$$

Find *z* parameters. [7]

(*b*) Write a short note on : Pole-zeros of network functions and stability. [6]