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

Seat
No.

[5352]-133

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

NETWORK THEORY
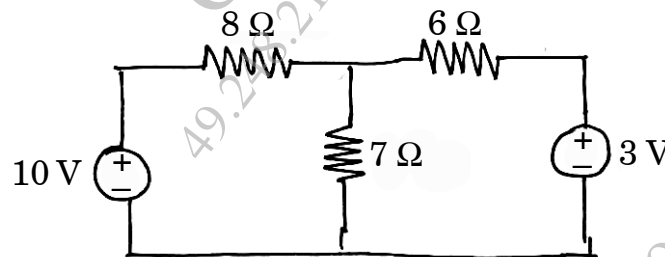
(2012 PATTERN)

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
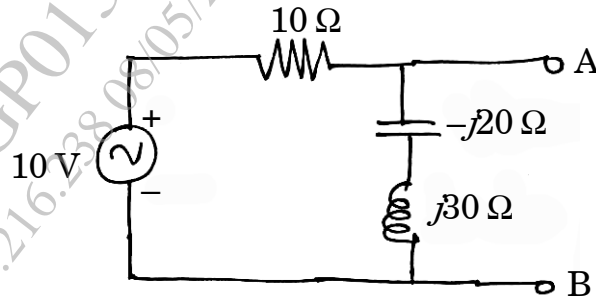resistor using superposition theorem.   [6]

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

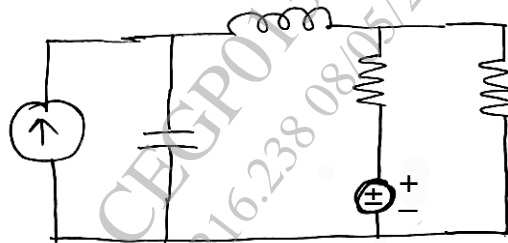(i) Oriented graph

(ii) Rank of graph
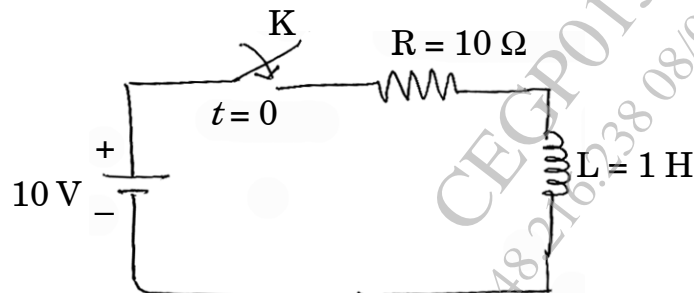
(iii) CoTree

(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, $\dfrac{di}{dt}$, $\dfrac{d^2 i}{dt^2}$ at $t = 0^+$. Assume initial current of inductor to be zero. [6]
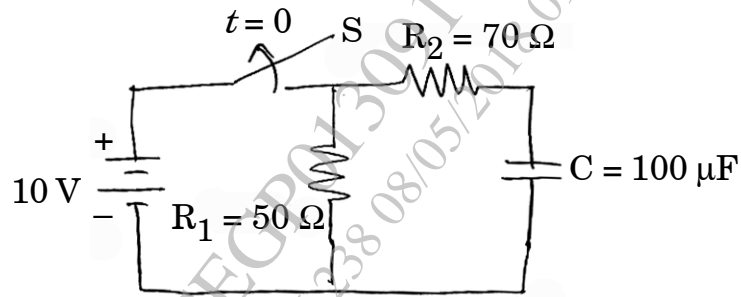
(*b*) An inductive coil having resistance of 50 Ω and inductance of 0.05 H is connected in series with 0.02 μF capacitor. Find : [6]

(*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.

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]
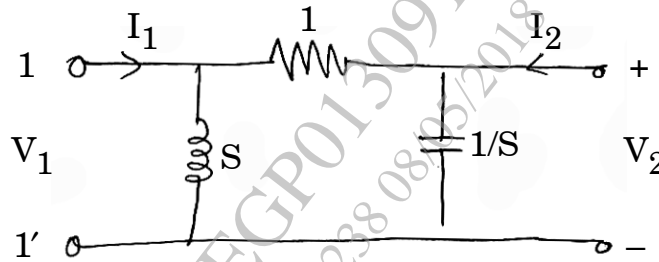
Or

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]