

Total No. of Questions—8]

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**[5459]-135**

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

**NETWORK THEORY**

**(2012 PATTERN)**

**Time : Two Hours**

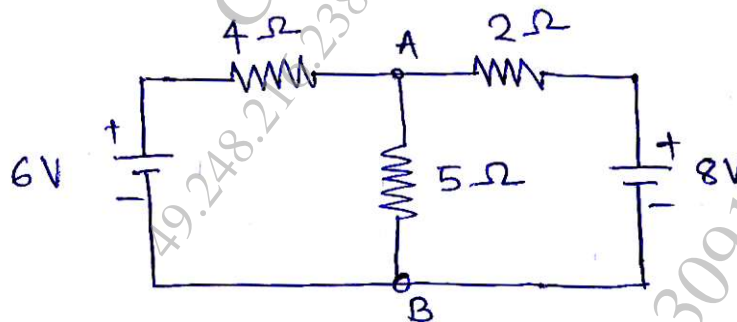
**Maximum Marks : 50**

**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 and Q. No. 7 or Q. No. 8.

(ii) Figures to the right indicate full marks.

(iii) Assume suitable data, if necessary.

1. (a) Find current through branch AB using Thevenin's theorem. [6]



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

(i) Oriented graph

(ii) Tieset matrix

(iii) F-cutset matrix.

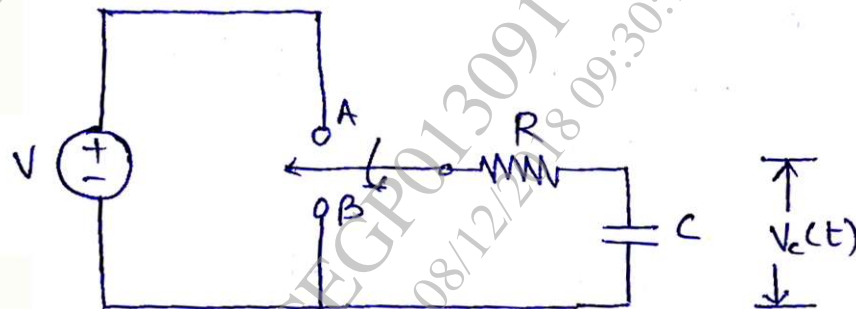
P.T.O.

2. (a) State and explain maximum power transfer theorem. [6]  
 (b) The reduced incidence matrix is : [6]

$$A = \begin{bmatrix} 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

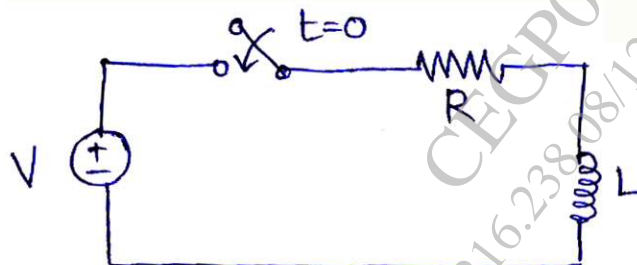
- (i) Obtain complete incidence matrix.  
 (ii) No. of trees possible.

3. (a) Derive the expression for the voltage  $V_c(t)$  across capacitor for the series RC circuit shown. [6]

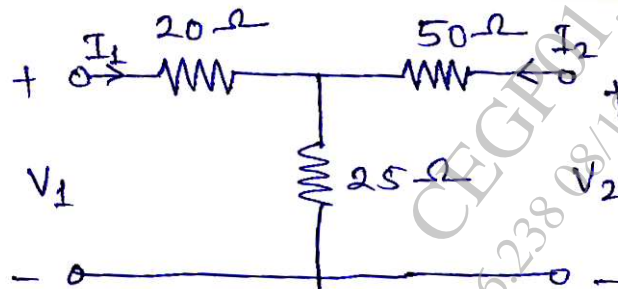


- (b) Define the term quality factor. Prove for a series RLC resonant circuit  $f_0 = \sqrt{f_1 f_2}$ . [6]

4. (a) For the circuit shown below, find the current  $i(t)$  for all time  $t > 0$ . [6]

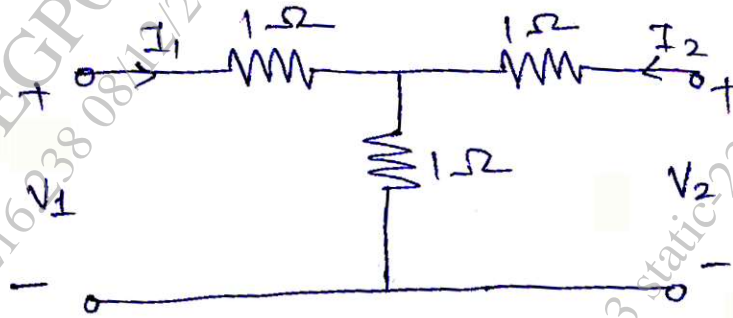


- (b) A series resonant circuit has a bandwidth of 100 Hz and contains a 20 mH inductance and a 20  $\mu$ f capacitance. Determine : [6]
- $f_0$
  - $Q_0$  and
  - Impedance  $Z$  at resonance.
5. (a) What is symmetrical network ? Explain *two* characteristics of symmetrical network. [6]
- (b) Design a constant K T type low pass filter with the following specifications : [7]
- Design resistance  $R_0 = 560 \Omega$  and  
Cut-off frequency  $f_c = 2 \text{ KHz}$ .
6. (a) Design symmetrical T attenuator with attenuation of 20 dB and design resistance of 600  $\Omega$ . [6]
- (b) A symmetrical T network is composed of pure resistance has the following values of open and short circuit impedance :  
 $Z_{oc} = 800 \Omega$   $Z_{sc} = 600 \Omega$   
Determine characteristic impedance  $z_0$ ,  $z_1$  and  $z_2$  for the T network. [7]
7. (a) Find  $z$ -parameters for the two port network shown below. State whether the network is symmetrical/asymmetrical. [7]



- (b) Find the condition of symmetry and reciprocity of Y parameters. [6]

8. (a) Find  $h$ -parameters for the n/w shown in fig. [6]



- (b) Explain the applications of Laplace Transforms to circuit analysis. [7]