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**[5668]-137**

**S.E. (E&TC/Elect.) (First Sem.) EXAMINATION, 2019**

**NETWORK THEORY**

**(2012 PATTERN)**

**Time : Two Hours**

**Maximum Marks : 50**

**N.B. :—** (i) Neat diagram must be drawn wherever necessary.

(ii) Figures to the right indicate full marks.

(iii) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.

(iv) Assume suitable data, if necessary.

**1. (a) State KVL and KCL. [6]**

**(b) The reduced incidence matrix is : [6]**

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

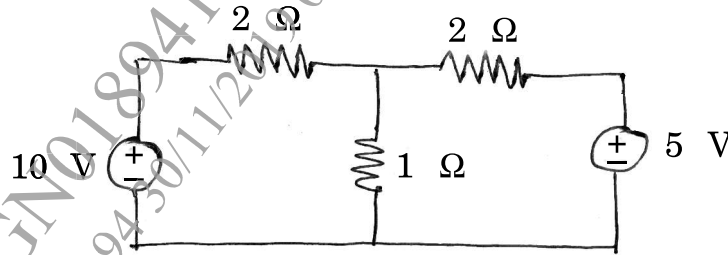
(i) Draw the graph.

(ii) How many trees are possible ?

P.T.O.

Or

2. (a) Find the current through  $1\ \Omega$  using superposition theorem. [6]



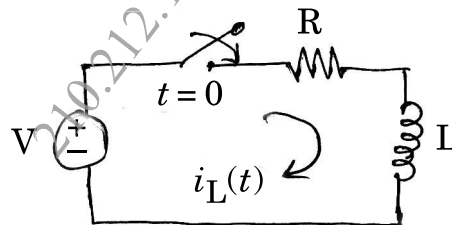
- (b) Explain with neat diagram : [6]

(i) Oriented graph

(ii) Tree

(iii) Co-tree.

3. (a) Derive the expression for current through inductor for  $t \geq 0$ . [6]



- (b) Define the following terms : [6]

(i) Resonant frequency

(ii) Bandwidth

(iii) Quality factor.

Or

4. (a) Draw transient response for 2nd order RLC circuit and explain rise time and settling time. [6]
- (b) A series resonant circuit has a bandwidth of 200 Hz and contains a 10 mH inductance and a 10  $\mu$ F capacitance. Determine : [6]
- (i)  $f_0$
- (ii)  $Q_0$  and
- (iii) Impedance  $Z$  at resonance.

5. (a) What is Filter ? Explain different types of filters in brief (any two). [6]
- (b) Design symmetrical T type attenuator with attenuation of 40 dB and design resistance of 1200  $\Omega$ . [7]

Or

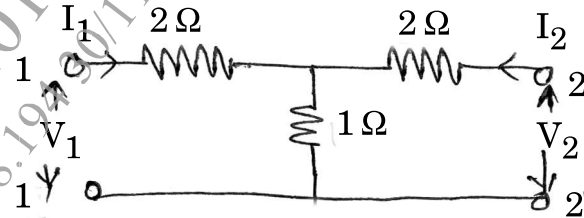
6. (a) Design a constant  $k$  type low pass filter with the following specifications : (Both T &  $\pi$ ) [6]

Design resistance  $R_0 = 600 \Omega$  and

Cut-off frequency  $F_c = 10 \text{ kHz}$ .

- (b) Explain the terms Decibel and Neper. Derive relation between them. [7]

7. (a) Derive the condition of symmetry and reciprocity for Z-parameters. [6]
- (b) Find the Z-parameters and verify reciprocity and symmetry conditions. [7]



Or

8. (a) Derive the condition of symmetry and reciprocity for Y-parameters. [6]
- (b) Define the terms poles and zeros for Network function. And explain network stability with the help of pole zero plot. [7]