

Total No. of Questions—8]

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[5152]-133**S.E. (E&TC/Electronics) (I Sem.) EXAMINATION, 2017****NETWORK THEORY****(2012 PATTERN)****Time : Two Hours****Maximum Marks : 50****N.B. :-** (i) Neat diagrams must be drawn wherever necessary.

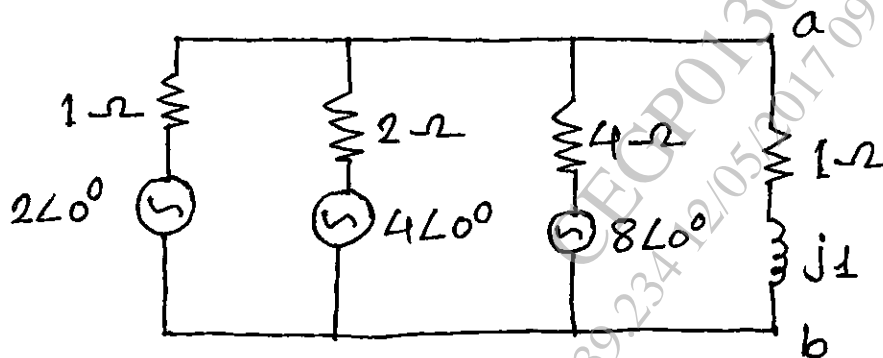
(ii) Figures to the right indicate full marks.

(iii) Your answers will be valued as a whole.

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

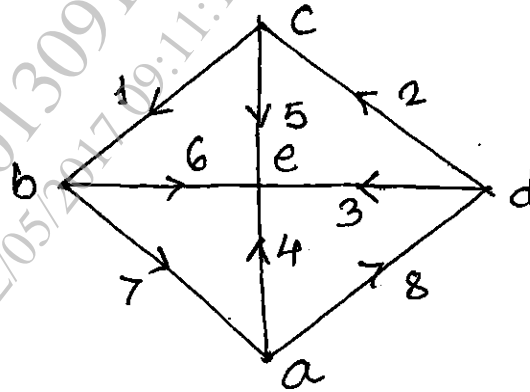
(v) Assume suitable data, if necessary.

1. (a) Find the current passing through the impedance $(1 + j1)$ in the circuit shown below, using Norton's theorem. [6]



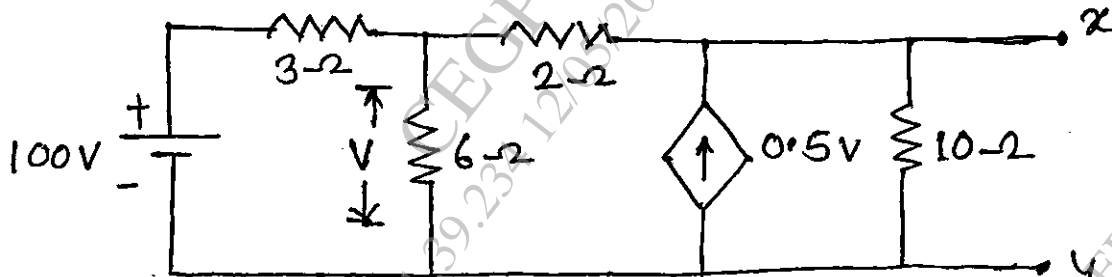
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- (b) What is meant by oriented graph ? Find the voltage drop equations for the oriented graph shown below. [6]



Or

2. (a) State Norton's theorem and find the Norton's equivalent circuit at the terminals xy of the circuit shown below. [6]



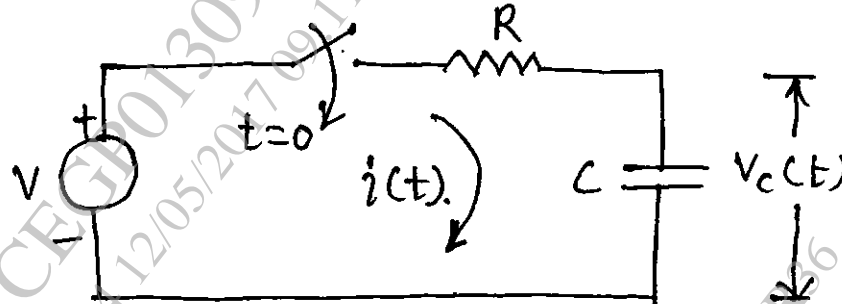
- (b) Explain the tree with example and determine the possible numbers of tree of a incidence matrix $[A]$ of a graph is given by : [6]

$$[A] = \begin{bmatrix} -1 & 0 & 0 & 1 \\ 1 & -1 & 1 & 0 \\ 0 & 1 & -1 & -1 \end{bmatrix}_{3 \times 4}$$

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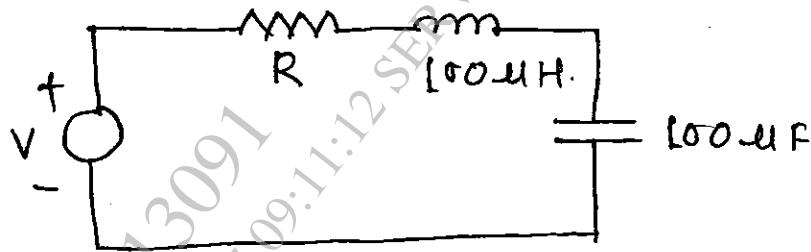
3. (a) Derive the expression for voltage across the capacitor and current flowing through it of circuit shown below : [6]



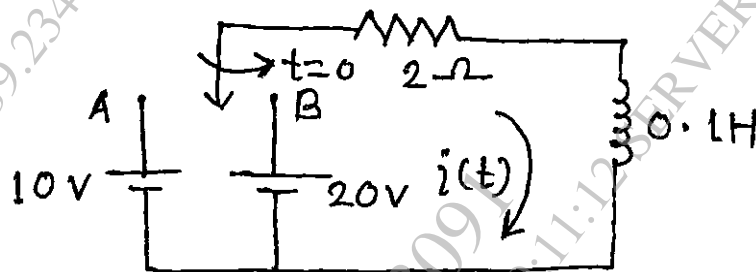
- (b) For a parallel resonant circuit, find :
- Specify the value of the circuit capacitor
 - Resistance of the circuit at parallel resonance
 - What is the absolute bandwidth of the resonant circuit ?
 - The bandwidth of the circuit, when it is matched with the generator impedance.
- When $Q = 75$, $L = 120 \mu\text{H}$ and resonating frequency of 1 MHz. [6]

Or

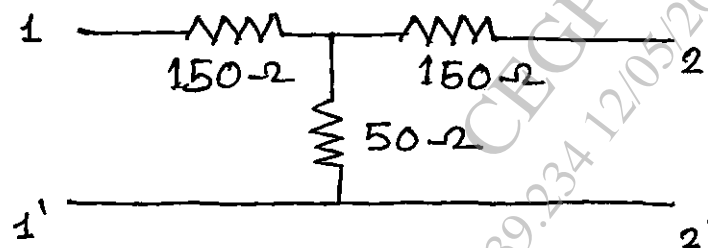
4. (a) The series resonant circuit has a lagging phase angle of 30° at $\omega_H = 12000 \text{ rad/sec}$. at what frequency will be leading by 30° . [6]



- (b) The circuit shown below find, the current flowing through the inductor, when switch is at position 'A' and 'B'. [6]

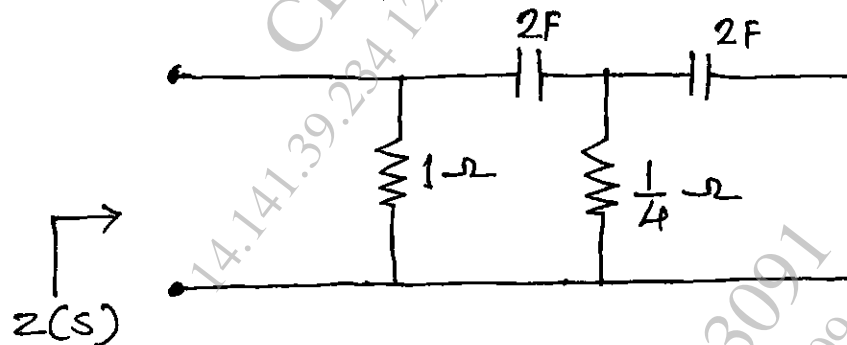


5. (a) Design a HPF, 'T' and 'π' section to work into impedance 500Ω , and have a cut-off frequency of 1 kHz. For this, calculate the phase angle β at frequency 1.5 kHz and attenuation α in neper at frequency of 0.9 kHz. [7]
- (b) A symmetrical 'T' attenuator shown below. Find OC & SC impedance, Z_0 . attenuation constant in dB : [6]



Or

6. (a) Design a constant 'K' Π section HPF to have a design impedance of 600Ω . The filter must have attenuation of 8.11 dB at 4.5 kHz and for this design calculate, phase angle in degree at frequency 5.5 kHz. [6]
- (b) Find the image and iterative impedance for the asymmetrical 'L' section whose series arm impedance is 400Ω and shunt arm impedance is 600Ω . Derive the formula used. [7]
7. (a) What is meant by poles and zeros ? For the network shown below find the $Z(s)$: [7]



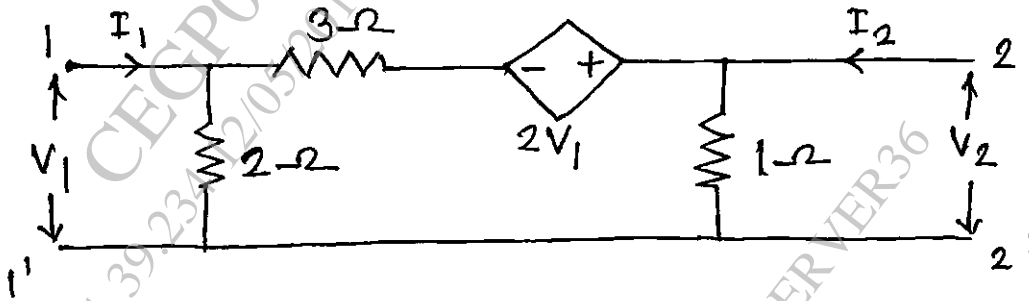
- (b) The Z-parameter of a circuit are given by : [6]

$$\begin{bmatrix} 4 & 1 \\ 3 & 3 \end{bmatrix}$$

Obtain the transmission parameters.

Or

8. (a) Derive the condition of Reciprocity and symmetry for the ABCD parameter. [6]
- (b) Determine the 'Y' parameters for the Network. [7]



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