Total No. of Questions—8]   [Total No. of Printed Pages—6

[5057]-244

S.E. (E&TC) (First Semester) EXAMINATION, 2016

NETWORK THEORY

(2012 PATTERN)

Time : Two Hours   Maximum Marks : 50

N.B. :— (i) Attempt Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6** and
Q. **7** or Q. **8**.

(ii) Figures to the right indicate full marks.

(iii) Neat diagrams must be drawn wherever necessary.
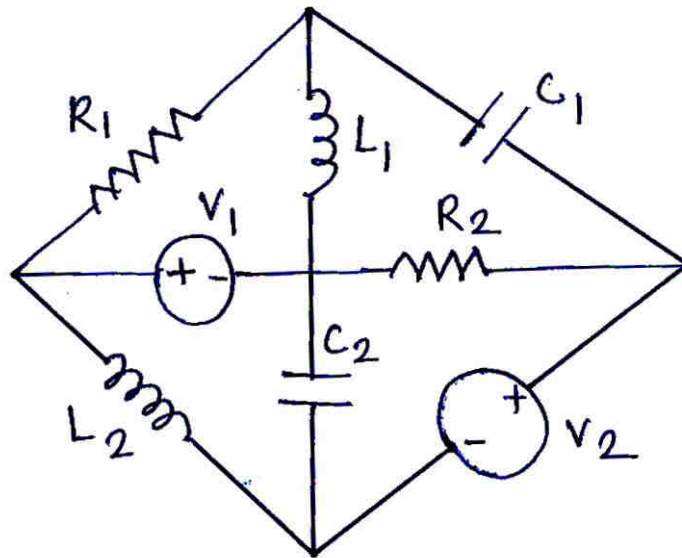
1. (a) State Thevenin theorem and find the equivalent circuit
for the circuit shown below. Find the current through the
$(2 + j2)\,\Omega$.   [6]
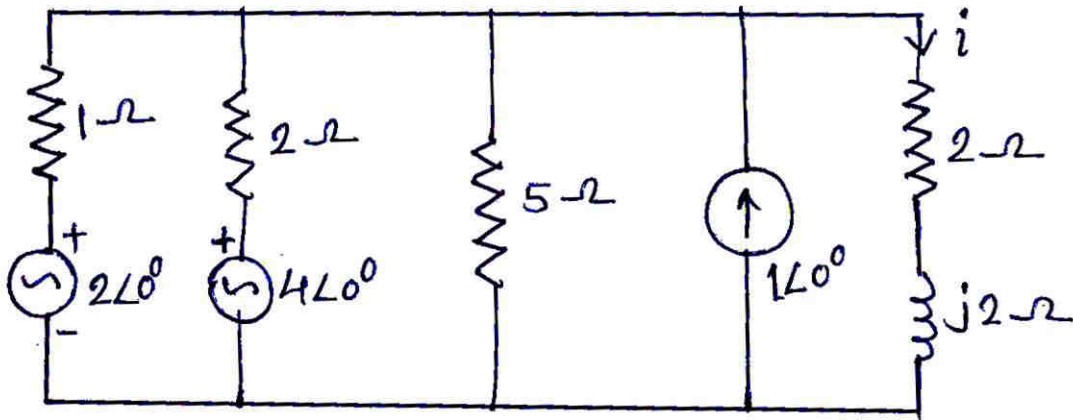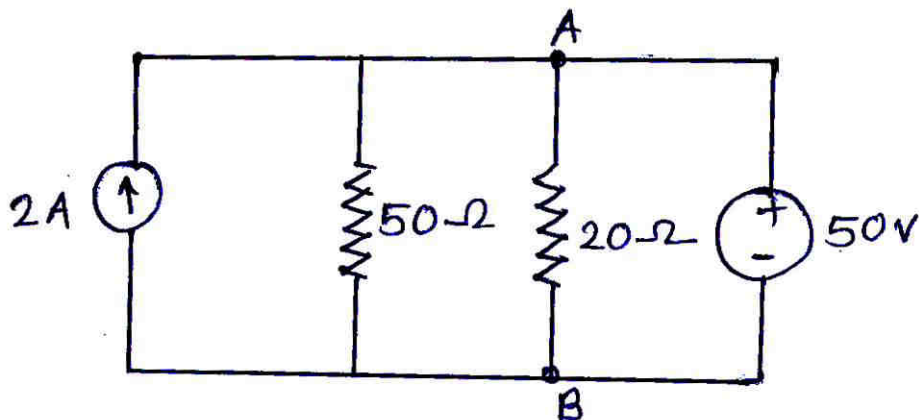
(b) Consider the below circuit. [6]

(1) Draw the corresponding graph.

(2) Obtain the complete incident matrix and reduced incident matrix.

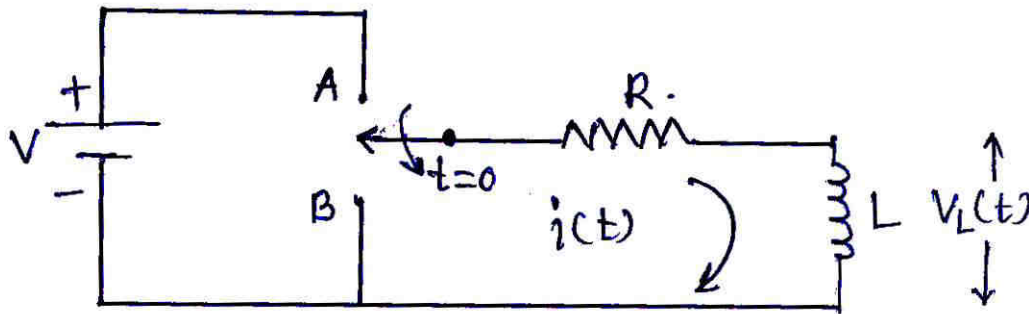(3) Find the possible number of trees.

Or

2. *(a)* State Norton theorem and find the Norton's equivalent circuit across AB in the circuit shown below. [6]

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

      (1)   Tie set matrix

      (2)   Incident matrix

      (3)   Oriented graph.

3.   (a)   Determine the expression for current flowing through the inductor ($i(t)$) of the circuit shown below.   [6]
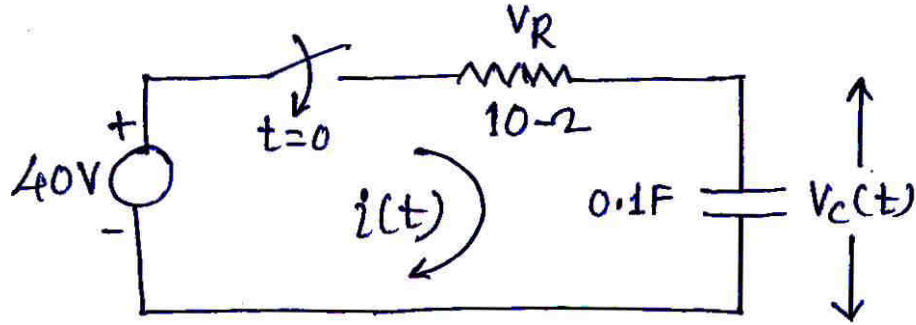

(b)   A circuit consisting of a resistance of 4 Ω and inductor of 0.5 H and a variable capacitor all in series connected across 100 V, 50 Hz supply. At resonance calculate :   [6]

      (1)   Capacitor

      (2)   Voltage across the inductor

      (3)   Q factor
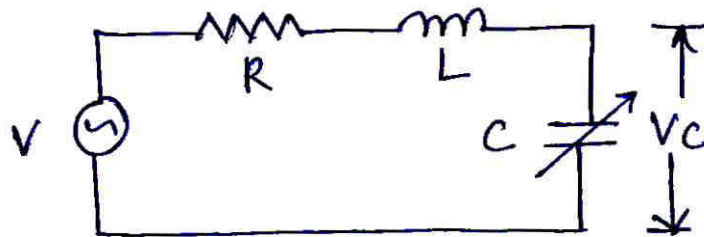
      (4)   Current in the circuit.

Or

4. (*a*)   The circuit shown below. Find the expression for $V_c(t)$ and $i_c(t)$. Initially the switch is open and at $t = 0$ is closed. [6]

(*b*)   Show that the value of capacitance for maximum voltage across the capacitor in case of series resonance circuit with capacitor tunning is given by : [6]

$$C = \frac{L}{R^2 + X_L^2}$$

5. (*a*)   For symmetrical network. Derive the expression for Z_{oc}, Z_{sc} and Z_o. [6]

(*b*)   Each of two series element of 'T' type LPF consists of an inductor of 60 mH and shunt element of 0.2 µf capacitor. Calculate cut off frequency and design impedance at 1 kHz. Also find the ratio of phase difference between i/p and o/p voltages of the filter al 1 kHz and 5 kHz. [7]

Or

6. (*a*) An attenuator is composed of symmetrical 'T' section having series arm of 175 Ω each, and shunt arm of 350 Ω. Find the characteristic impedance and attenuation in dB. [6]

(*b*) Explain the '*m*' derived filter and design 'T' and 'π' section of a prototype HPF having cutoff frequency of 20 kHz and design impedance of 450 Ω also find the characteristic impedance at 25 kHz and attenuation at 4 kHz. [7]

7. (*a*) What is mean by network function ? Explain various types of network functions for one port and two port network. [6]

(*b*) Find the 'Y' parameter of network shown below. [7]
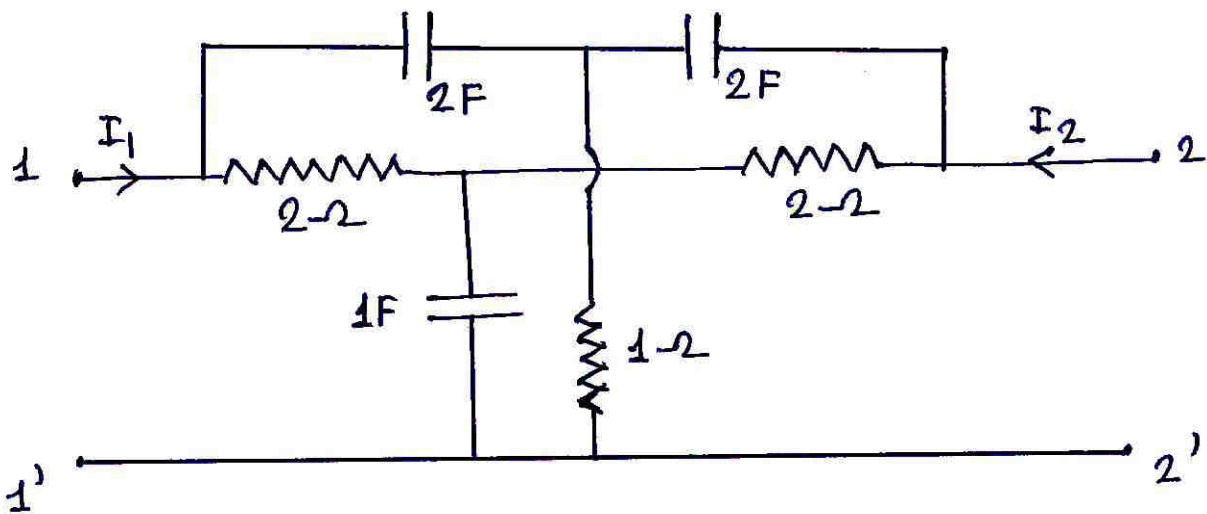
Or

8. (*a*) Find the 'Z' parameter of the network shown below. [6]
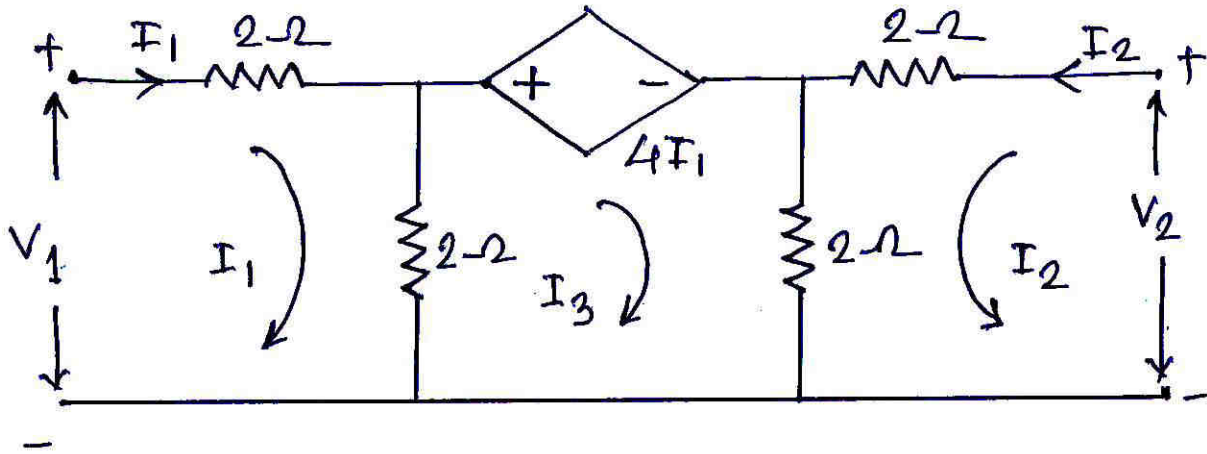
(*b*) Derive the condition of Reciprocity and Symmetry for 'Y' parameters in '2' port network. [7]