[Duration: 3 Hours]   [Max Marks: 80]
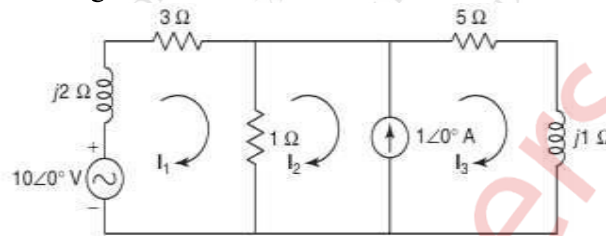
N.B.: (1) Question No 1 is Compulsory.
       (2) Attempt any three questions out of the remaining five.
       (3) All questions carry equal marks.
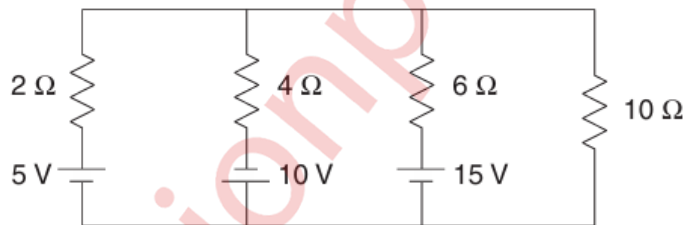   (4) Assume suitable data, if required and state it clearly.

Q1   Solve any FOUR
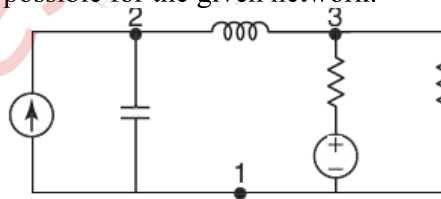   A   Find the current through 3 Ω resistor in the network.   (05)

   B   The Z parameters of a two-port network are Z11 = 20 Ω, Z22 = 30 Ω,   (05)
       Z12 = Z21 = 10 Ω. Find Y and ABCD parameters.

   C   In the network shown, find the current through the 10 Ω resistor.   (05)

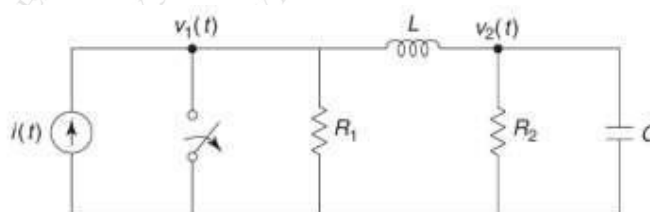   D   Test whether the polynomial.   (05)
       $P(S) = S^7 + 2S^6 + 2S^5 + S^4 + 4S^3 + 8S^2 + 8S + 4$ is Hurwitz

   E   How many trees are possible for the given network.   (05)
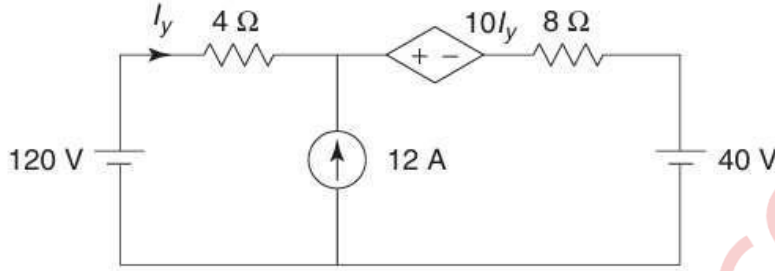

Q2   Solve the following:

   A   The network shown in Figure has two independent node pairs. If the switch is   (10)
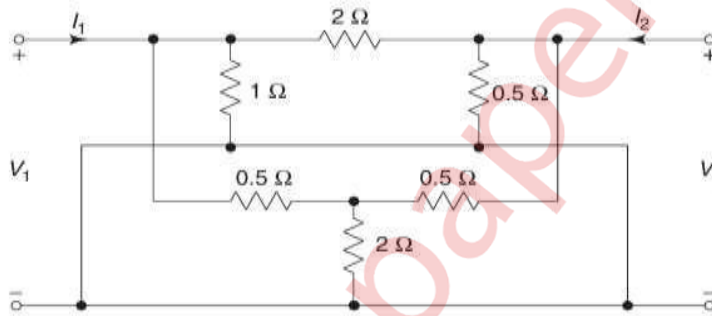   opened at t = 0, Find v_1, v_2, dv_1/dt and dv_2/dt at $t = 0^+$

B Find the current Iy using superposition theorem: **(10)**

Q3. **Solve the following:**

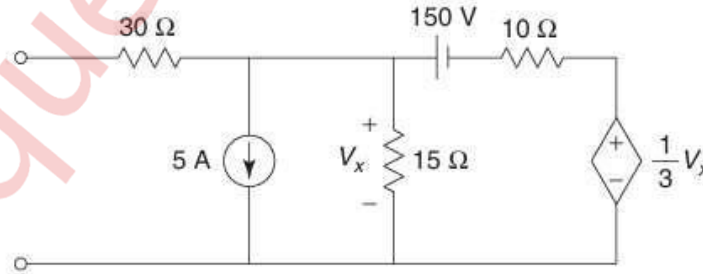**A** Determine Y parameters for the network **(10)**

B Synthesize Foster – I and Foster – II forms of the LC impedance function **(10)**

$$Z(s) = \frac{(s^2 + 1)(s^2 + 3)}{s(s^2 + 2)}$$

Q4. **Solve the following:**

A Obtain the Thevenins equivalent for the given network **(10)**

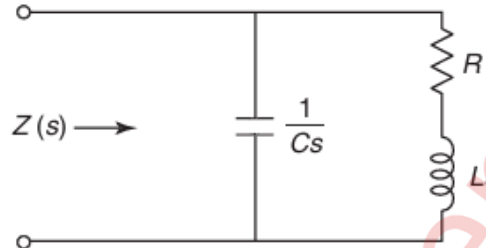**B** Test whether $F(s) = \dfrac{2s^3 + 2s^2 + 3s + 2}{s^2 + 1}$ is positive real function. **(10)**

X525YA1DEB5X525YA1DEB5X525YA1DEB5X525YA1DEB5

Q5. **Solve the following:**

A A network is shown in figure. The poles and zeros of the driving point **(10)** function Z(s) of this network are at the following places:
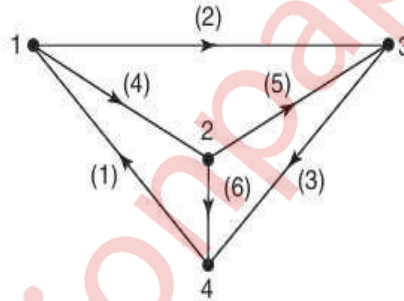
Poles at $-\frac{1}{2} \pm j\frac{\sqrt{3}}{2}$

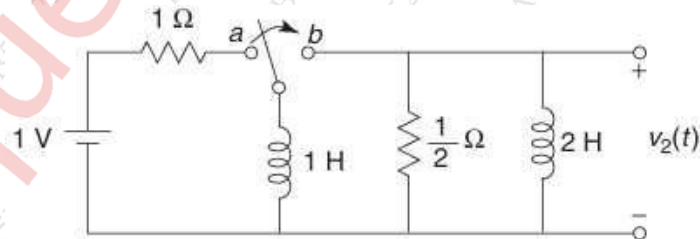Zero at -1

If Z(j0) = 1, determine the values of R,L and C

B Find incidence matrix, tieset matrix and f-cutset matrix from given graph. **(10)**

Q6. **Solve the following:**

A In the network shown, switch is in position 'a' for long time. At t = 0, the **(10)** switch is moved from a to b. Find $v_2(t)$. Assume that the initial current in 2H inductor is zero.

B Find the condition of reciprocity and symmetry for ABCD parameters. **(10)**

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