Con. 9932-13.   **GX-12179**

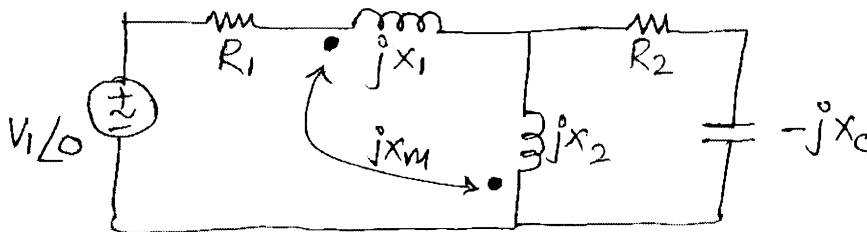(3 Hours)   [**Total Marks : 80**

N.B. : (1) Question No. **1** is **compulsory**.
      (2) Solve any **three** questions from QuestionsNos. **2** to **6**.
      (3) Assume **suitable** data if **necessary.**

1. (a) Write a note on time constant in transient circuits.   4
    (b) Define pole and zero of a network function and draw p-z plot for   4

$$V(s) = \frac{3(s+1)}{(s+2)(s^2+4s+5)}$$

   (c) Write the Mesh questions for the circuit shown.   4

    (d) Derive the s – domain equivalents for inductor with initial current I_0 and capacitor   4
       with initial voltage V_0

    (e) What is network synthesis? Realize the network function   4

$$Y(s) = 4s + 9/s + \frac{15s}{s^2+4}$$

2. (a) Write incidence matrix, tieset matrix and cutset matrix for the graph shown, where   10
      (1), (3), (5) and (7) are links of the graph.
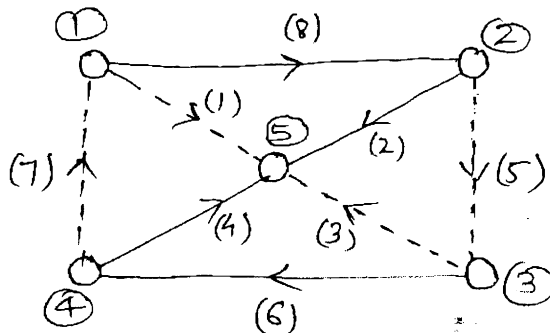
    (b) For the transient circuit shown, determine i(t) for $t \geq 0$ using L.T. application.   6
      Also calculate $i(\infty)$.
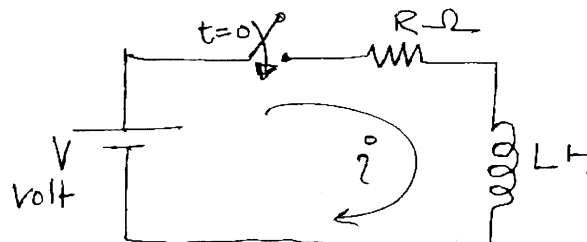
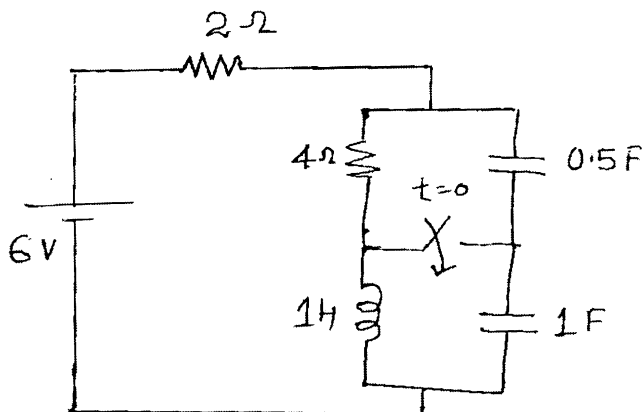   (c) Explain Natural response and forced response.   4

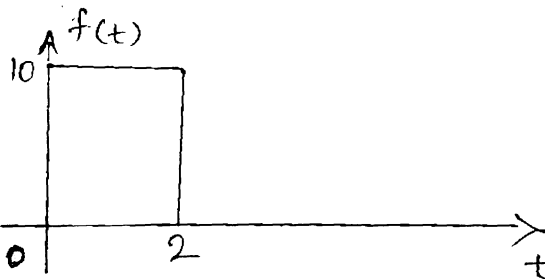**[TURN OVER**

3. (a) Determine loop currents at $t = 0+$ for the circuit shown.   **10**
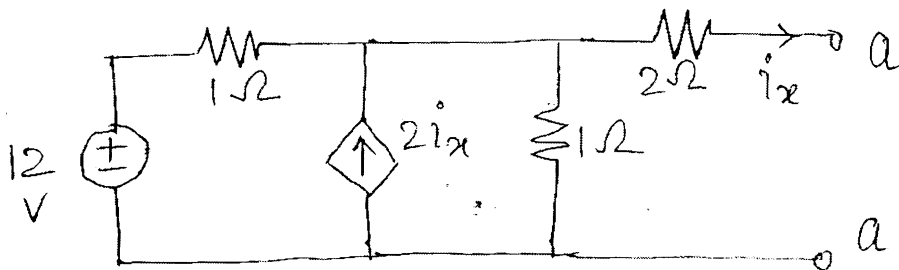

(b) Determine the L. T. of the gate function.   **2**
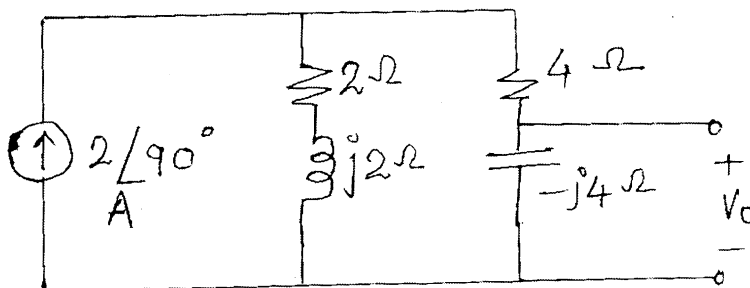

(c) Find Thevenin's equivalent across $a - a^1$ **8**

4. (a) State reciprocity theorem and verify the same for the circuit shown.   **10**

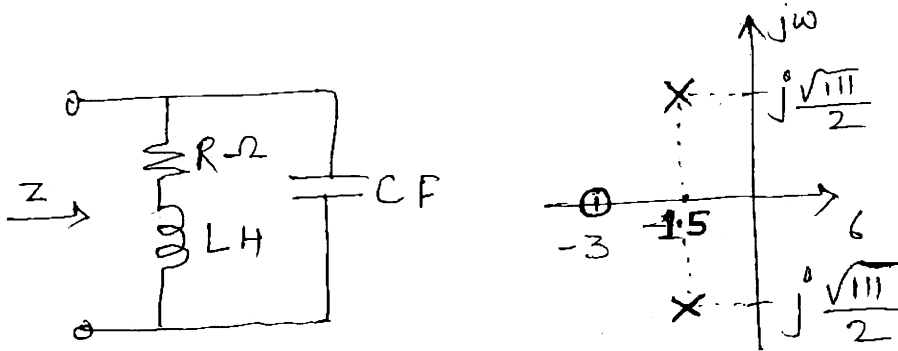(b) Check the polynomial P(s) for Hurwitz.   **6**

$$P(s) = s^3 + 4s^2 + 5s + 20$$

(c) Explain the principle of duality with example.   **4**

5. (a) For the network shown, the impedance function has p – z plot given below with   **8**
     z(0) = 1. Find the values of R, L and C.
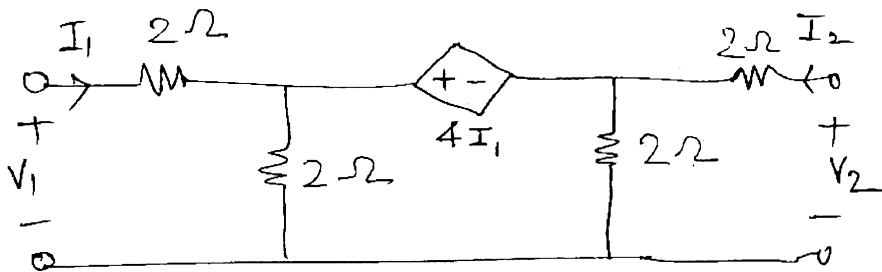

  (b) Realize the network function in F - I and F - II forms   **10**

$$Y(s) = \frac{s(s+2)(s+6)}{(s+1)(s+4)(s+8)}$$

  (c) Define Transmission parameters.   **2**

6. (a) Express h–parameters in terms of z–parameters and find z and h parameters for   **10**
     network shown.

  (b) State and explain Millman's theorem.   **6**
  (c) Discuss in brief the significance of dot convention.   **4**