Electrical Network Analysis & Synthesis

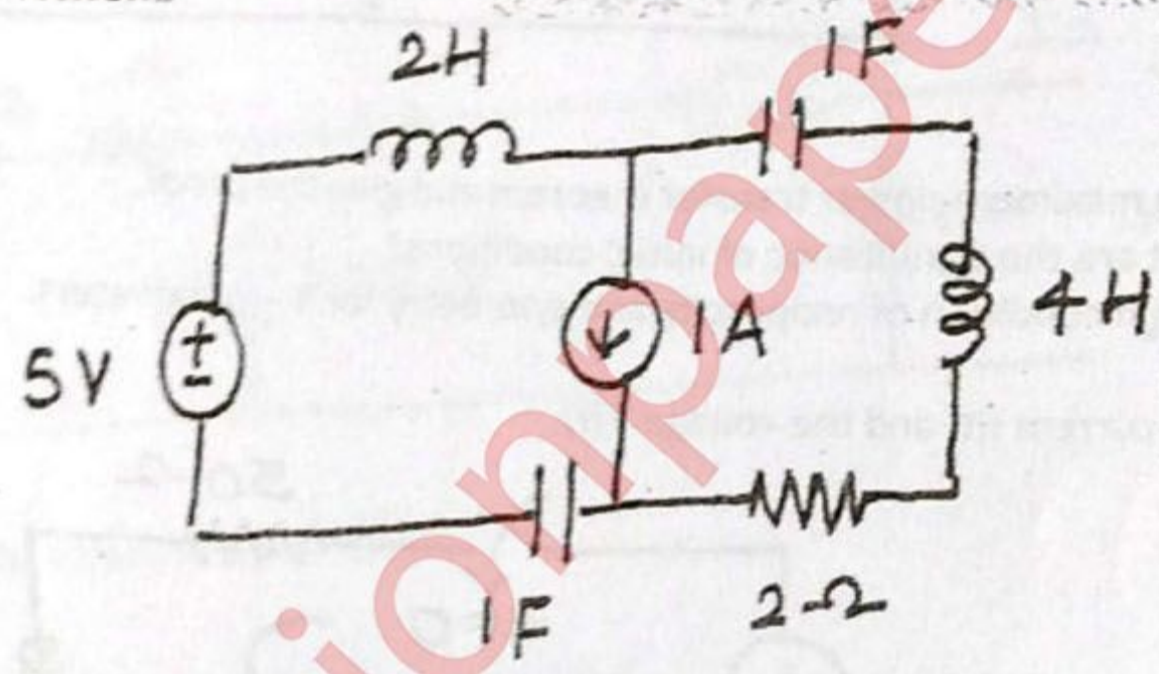Q.P. Code :24697

MAY-18

[Time: Three Hours]

(18)

[Marks:80]

Please check whether you have got the right question paper.

N.B:
1. Question.No.1 is compulsory.
2. Attempt any THREE questions out of remaining FIVE questions.
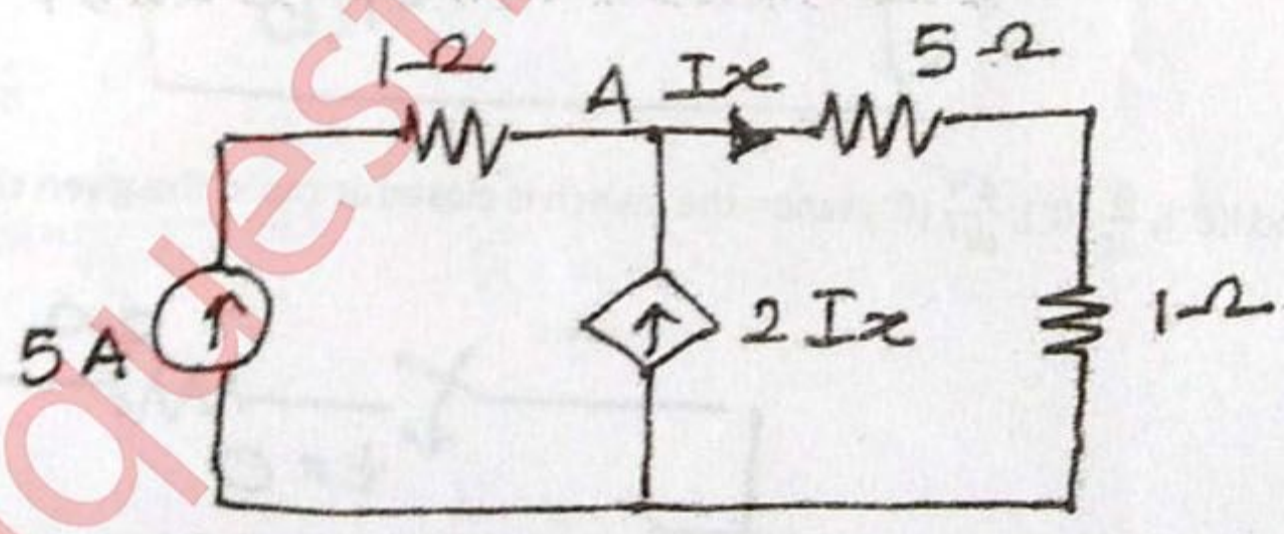3. Assume suitable data if necessary.

Q.1 a) Determine poles & zeros of following impedance function. (05)

$$Z(s) = \frac{15(s^3 + 2s^2 + 3s + 2)}{s^4 + 6s^3 + 8s^2}$$

b) Draw dual of a given network. (05)

c) Find I_x and V_A (05)
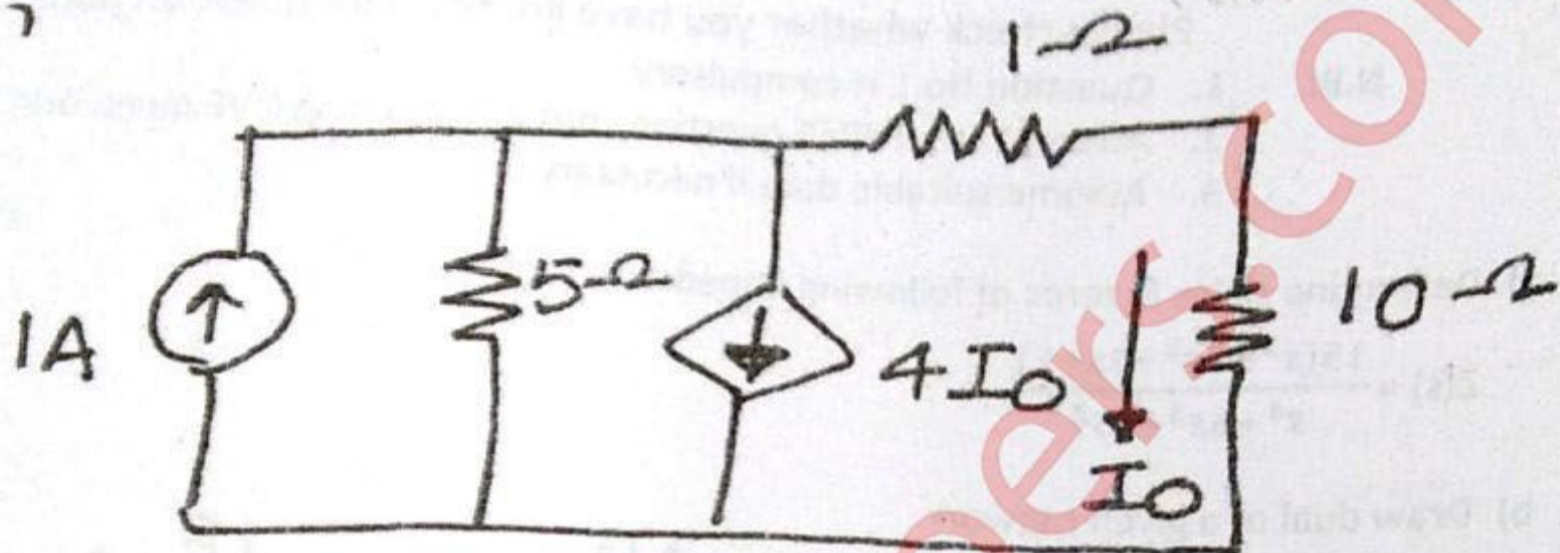

d) Test whether the polynomial P(s) is Hurwitz. $P(s) = S^5 + 3S^3 + 2S$ (05)

Q.2 a) The reduced incidence matrix of an oriented graph is (10)

$$A = \begin{bmatrix} 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$
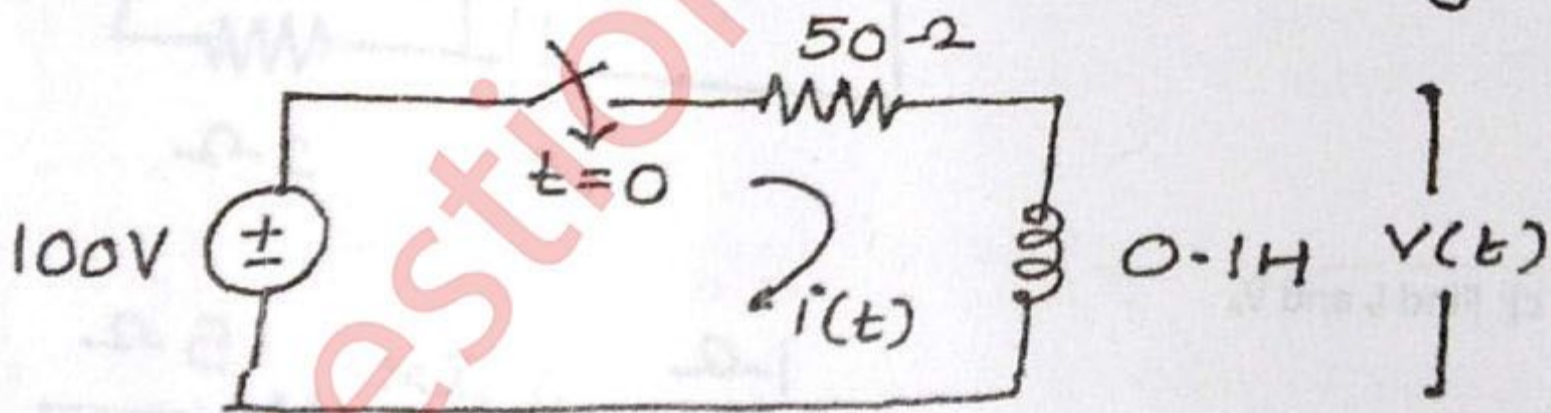
i) Draw the oriented graph
ii) Write tie-set matrix
iii) Write cut-set matrix.

b) Find power loss in the 10Ω resistor in the circuit shown below using Norton's theorem   (10)
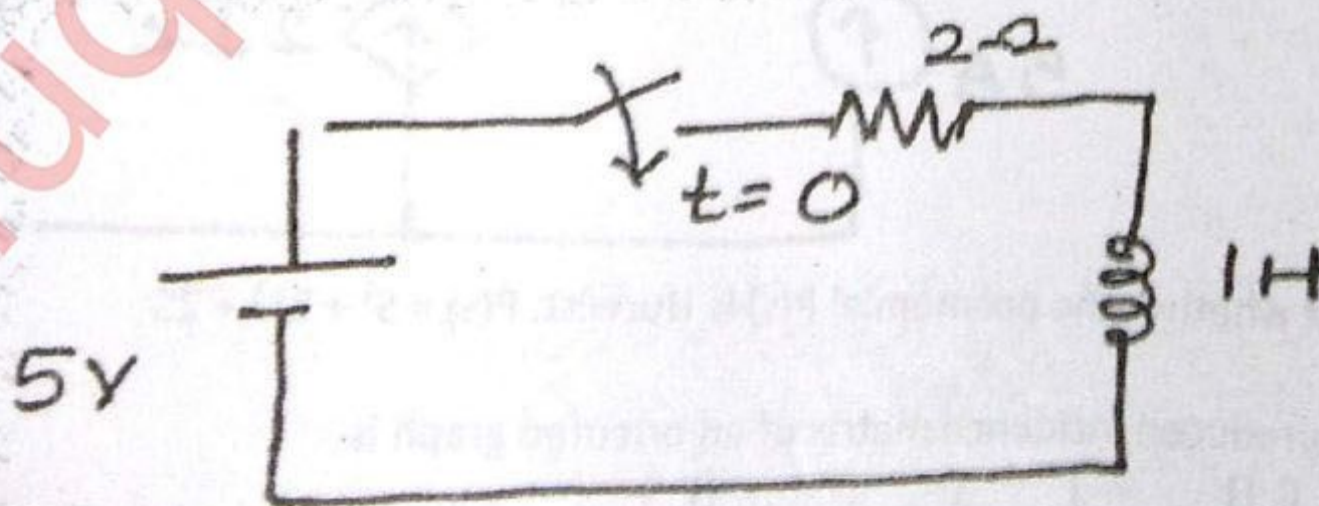

Q. 3   a) State maximum power transfer theorem and give the proof.   (05)
        b) What are the significance of initial conditions?   (05)
        c) Explain condition of reciprocity and symmetry for Y – parameters.   (10)
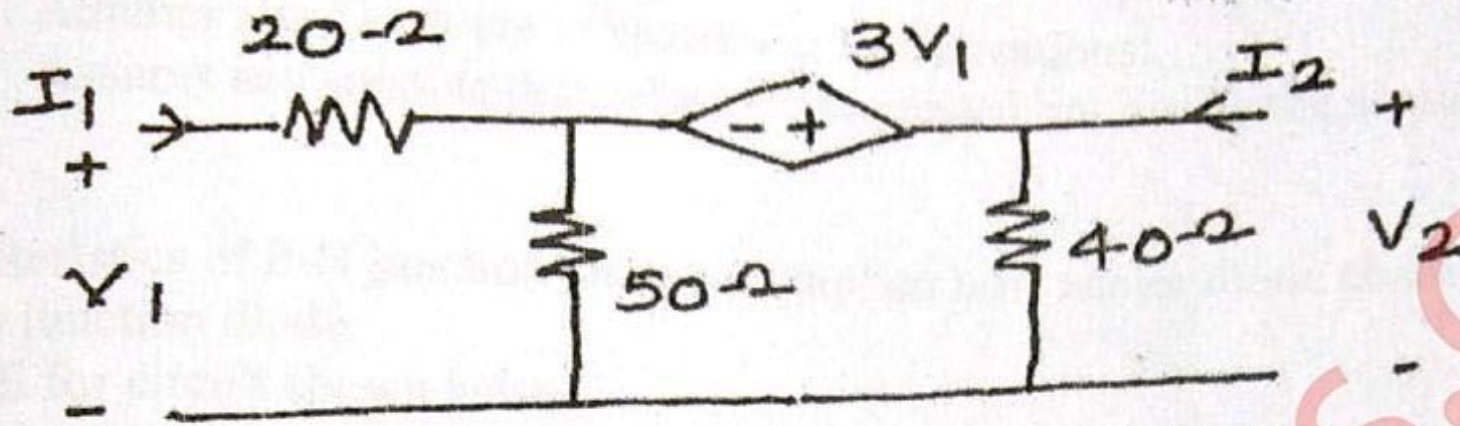
Q. 4   a) Find current i(t) and the voltage V(t)   (10)

b) Find $i(0^+)$, $\frac{di}{dt}(0^+)$, $\frac{d^2i}{dt^2}(0^+)$ when the switch is closed at t=0 in the given circuit.   (10)
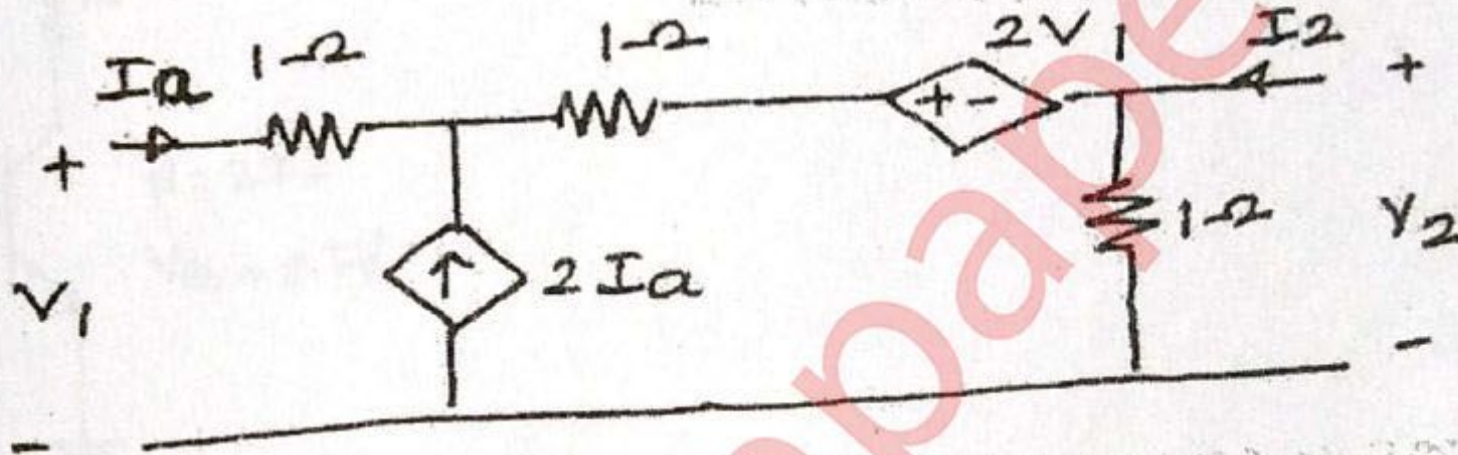
Q.5 a) For a given network find Z – parameters. **(10)**

b) Find voltage ratio transfer function G_{21} for network shown. **(10)**

Q.6 a) Synthesize the given function in Cauer I form. **(06)**
$$Z(s) = \frac{3(s+2)(s+4)}{s(s+3)}$$

b) Sythesize following impedance function in Cauer II form **(06)**
$$Z(s) = \frac{s^3 + 2s}{s^4 + 4s^2 + 3}$$

c) Test whether $F(s) = \dfrac{s^3 + 1}{s^3 + 4s}$ is p.r.f. **(08)**

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