[Time: Three Hours]   **[Marks:80]**
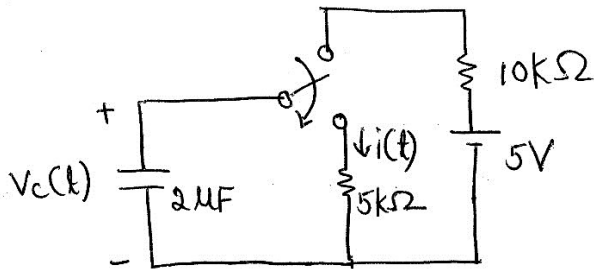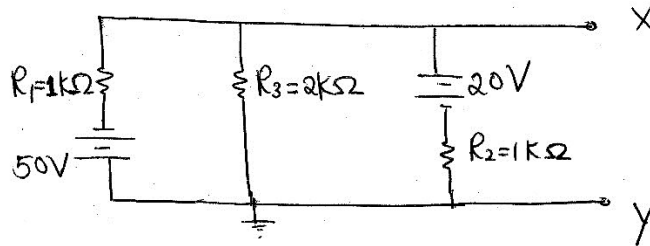
Please check whether you have got the right question paper.

N.B: 1.   Question.No.1 is compulsory.
        2.   Attempt any three from remaining.
        3.   Assume suitable data if necessary.

Q.1   a)   Determine $Vc(0^+), Vc(0^-), i(0^+), i(0^-)$, Obtain time constant for t > 0 and current i(t) for t > 0.   10
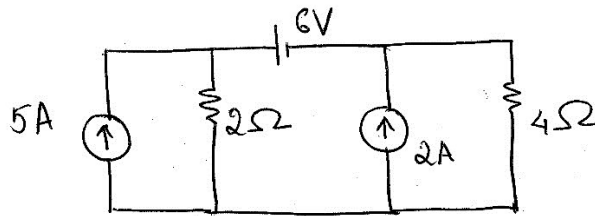

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i.   In the figure blow apply Millman's theorem to solve for the voltage Vxy.
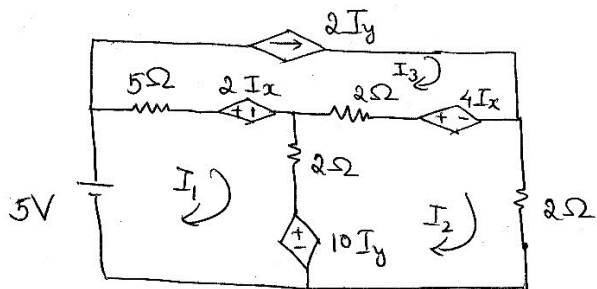

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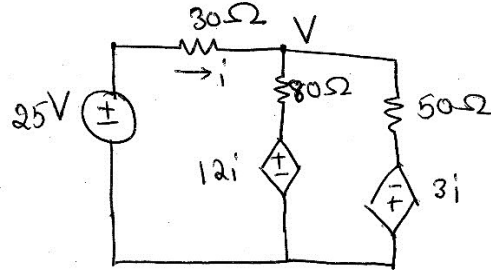ii.   Find current I using source transformation through. 4Ω Resistor.

Q.2   a)   Using mesh analysis find the currents I_x and I_y.   10
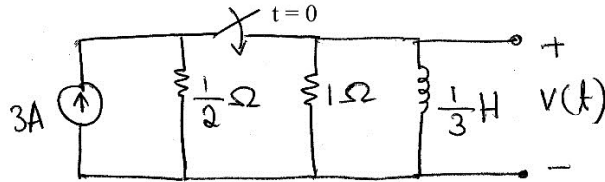

TURN OVER

    i.   Draw the oriented graph from the incidence matrix given below.   05

$$\begin{bmatrix} 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 0 \end{bmatrix}$$

    ii.   Using source transformation find the voltage V.   05

Q.3   a)   In the network shown, the switch is closed at t = 0. Find $v(t)$ for t > 0.   10

     b)   Explain the difference between dependent and independent sources, also write down the various   10
         types of dependent sources with relevant examples.

Q.4   a)   Test the three polynomials $K_1(s), K_2(s)$ and $K_3(s)$ for Hurwitz criteria   10
        i) $K_1(s) = 2s^4 + s^3 + 7s^2 + s + 1$
        ii) $K_2(s) = s^4 + 2s^3 + 2s^2 + 2s + 1$
        iii) $K_3(s) = s^3 + s^2 + s + 2$
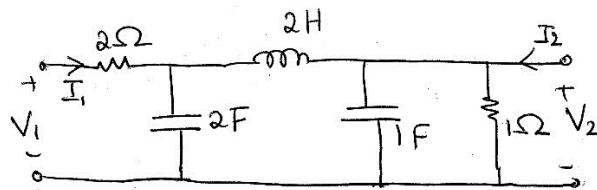
     b)   Realise the network for the following functions using specified method.   10
        i. $Z(s) = \dfrac{s^4 + 4s^2 + 3}{s(s^2 + 2)}$ (Foster I)
        ii. $Y(s) = \dfrac{6s^4 + 42s^2 + 48}{s^5 + 18s^3 + 48s}$ (Cauer I)
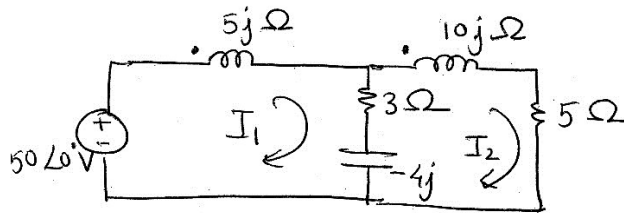
Q.5   a)   Derive the condition of reciprocity and symmetry for transmission parameters/ chain parameters.   10
     b)   Determine ABCD parameter of the given network.   10

Q.6   a)   Find the voltage across 5Ω resistor using mesh analysis   10

b)   Find 'i' current in the given circuit using superposition theorem.   10

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