Sem III / Electrical Networks Analysis / INST / 12-12-14
Synthesis

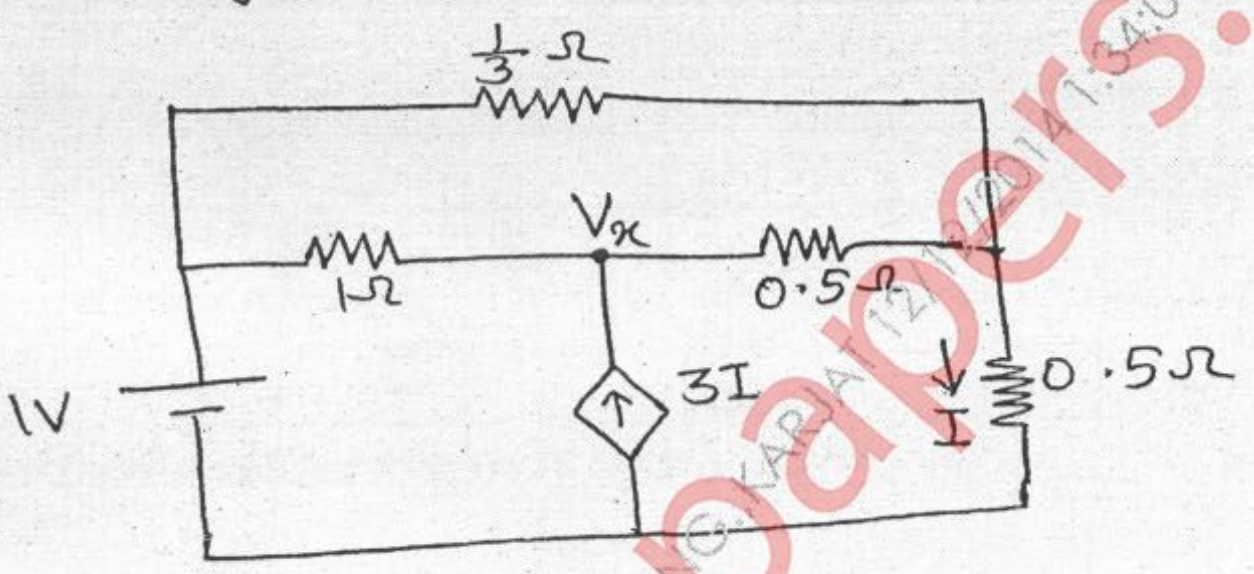
QP Code :14678

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

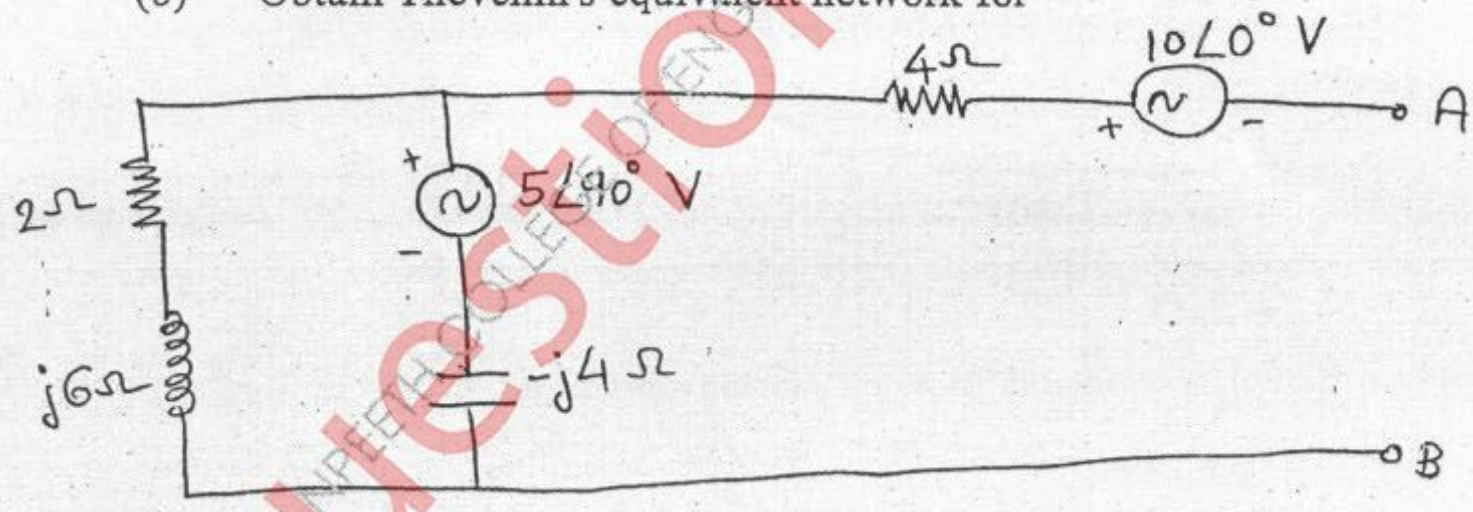
N.B. : (1) Question no. **1** is **compulsory**.
(2) Attempt any **3** from the remaining **5** questions.
(3) **Figures** on the **right** indicate **full** marks.
(4) **Assume** suitable data, wherever **necessary**.

1. Solve any **four** :– **20**

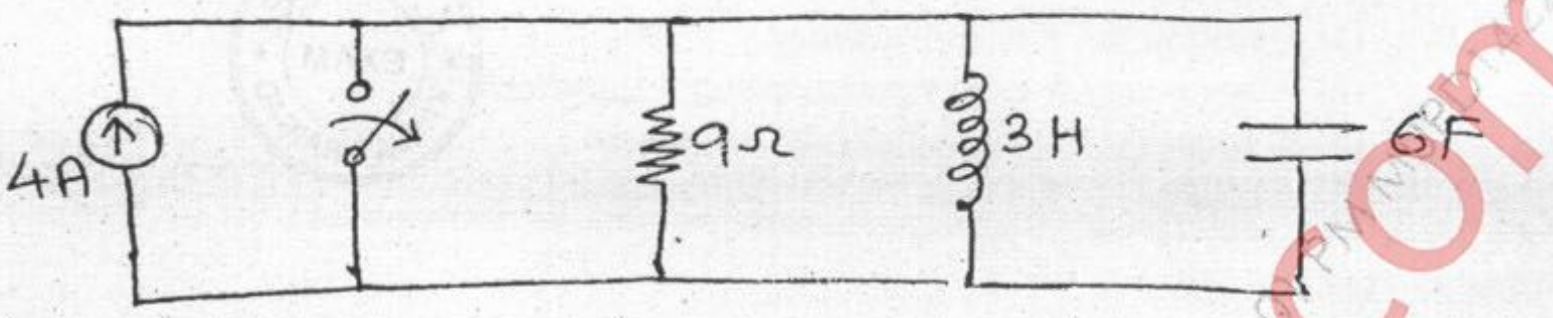
(a) Find voltage V_x by nodal analysis.



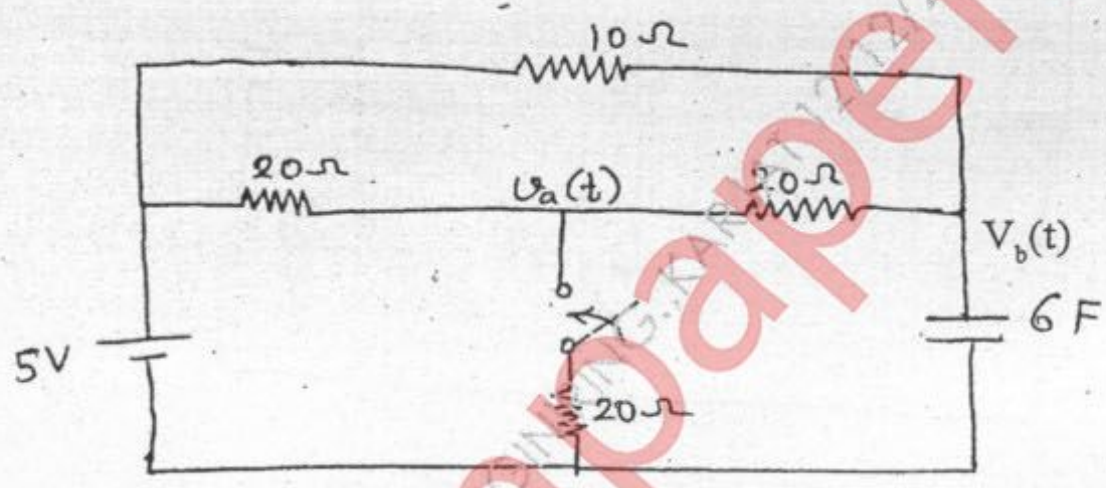
(b) Obtain Thevenin's equivalent network for



(c) Draw the dual network for circuit shown.

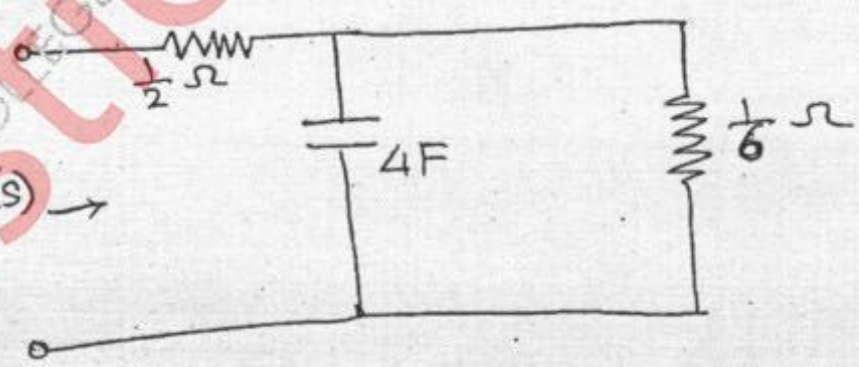


(d) In the network steady state is reached with the switch open. At t = 0 switch is closed. Determine $V_a(0^+)$ and $V_b(0^+)$



(e) Test whether polynomial $P(s) = S^5 + S^3 + S$ is Hurwitz.

(f) Determine poles and zeros of the impedance function Z(s) in network shown.

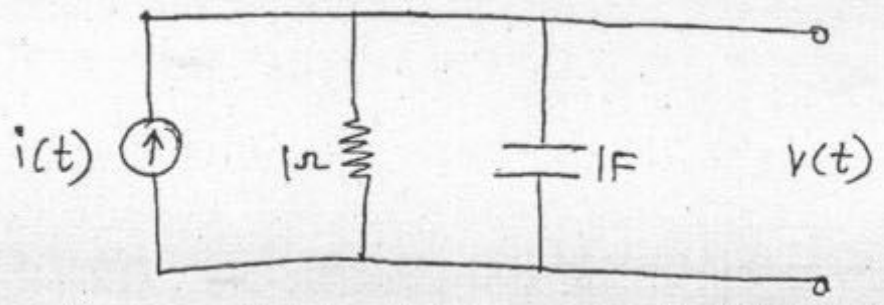


2. (a) For network shown, determine v(t) when input is : 10

(i) Impulse function

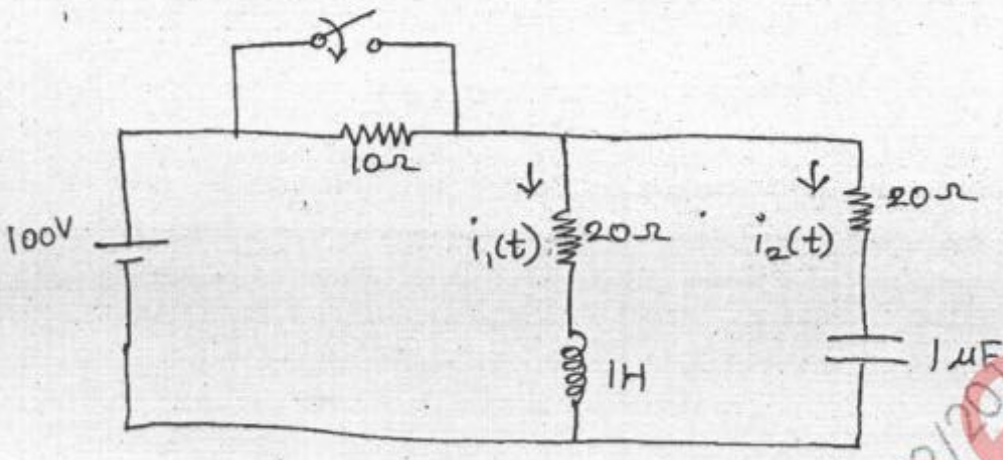
(ii) Unit step

(iii) $i(t) = 4e^{-t}\,u(t)$

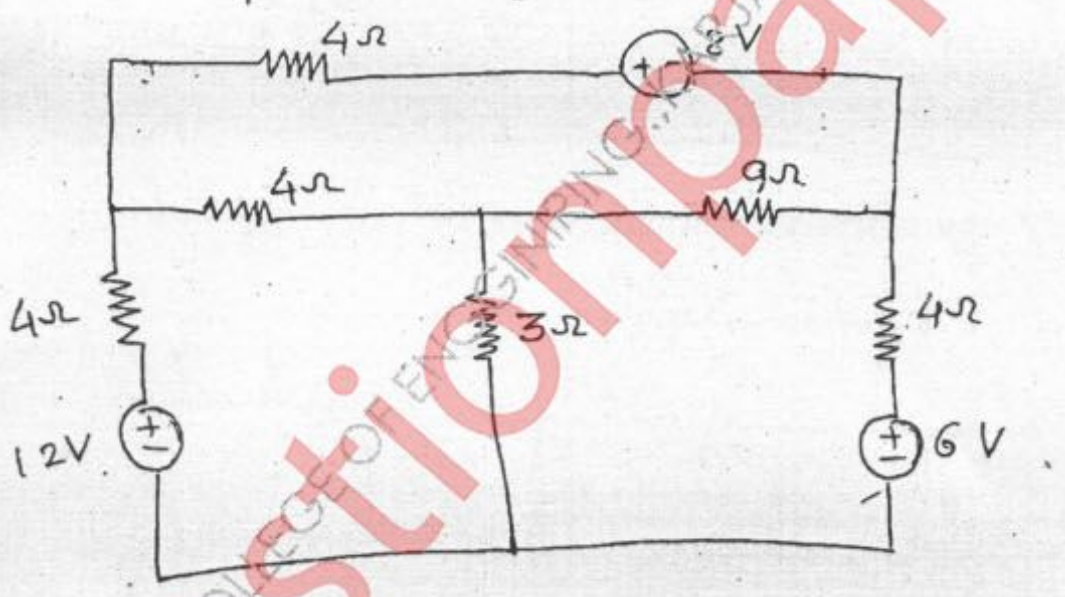


(b) Steady state is reached with switch open. **10**

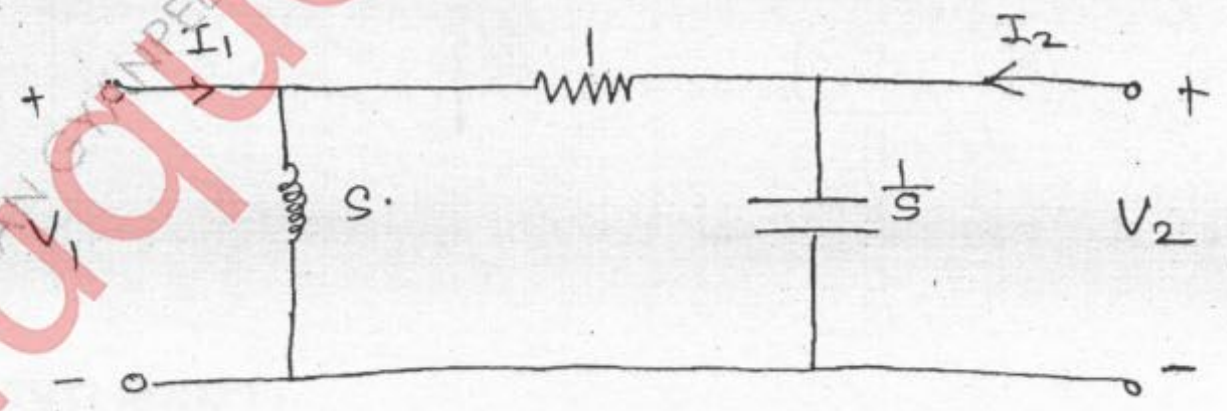
At t = 0 switch is closed. Determine $i_1(0^+)$, $i_2(0^+)$, $\frac{di_1}{dt}(0^+)$ and $\frac{di_2}{dt}(0^+)$



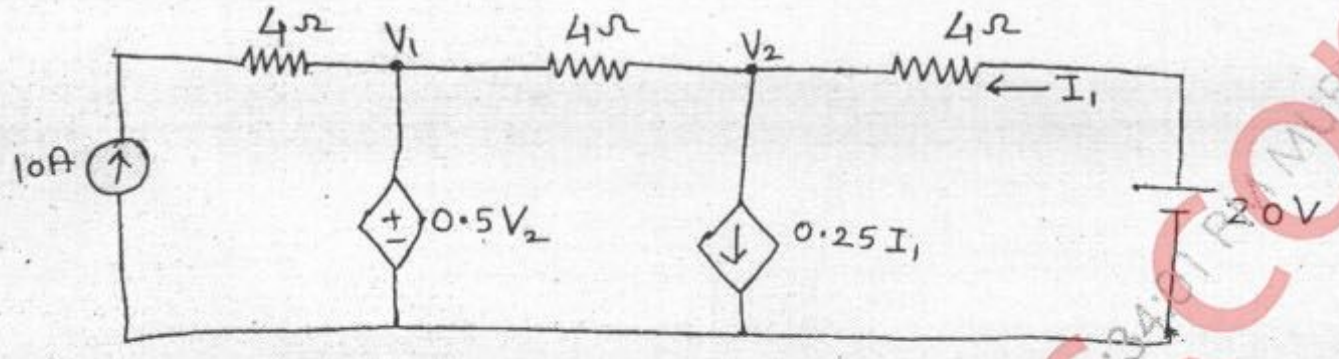
3. (a) For the network shown, write down tieset matrix and obtain the network equilibrium equation in matrix form using KVL. Calculate loop currents. **10**



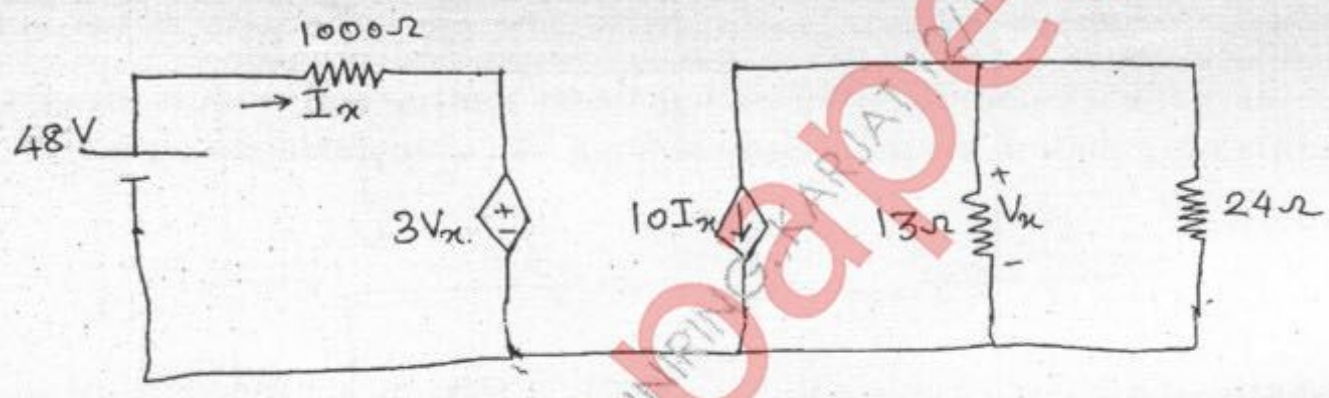
(b) Determine ABCD parameters for the network shown. **10**



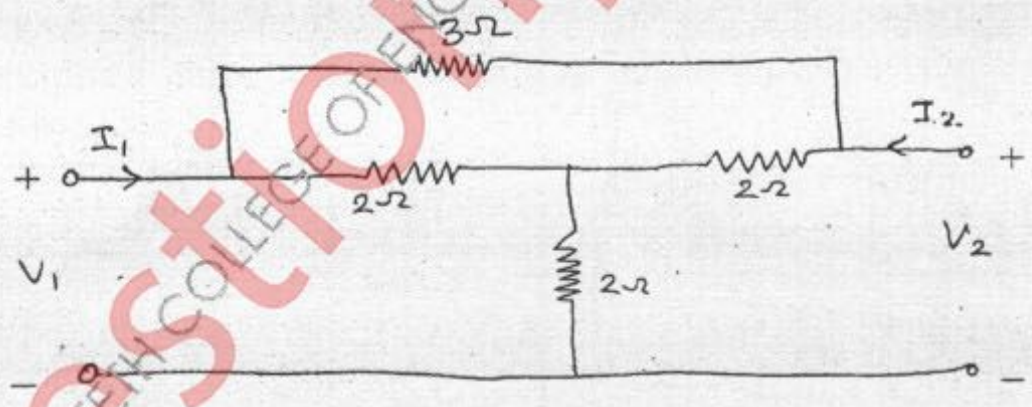
4. (a) Determine voltages V_1 and V_2 using superposition theorem. 10



(b) Find current in 24Ω resistor using Norton's equivalent circuit. 10



5. (a) Determine Y - parameters for the network. 10



(b) Realize the given function for Foster I and Foster II forms. 10

$$Z(s) = \frac{2\left(s^2+1\right)\left(s^2+9\right)}{s\left(s^2+4\right)}$$

6. (a) Test whether $F(s)=\frac{s^4+3s^3+s^2+s+2}{s^3+s^2+s+1}$ is positive real function. 10

(b) Find the voltage across 5Ω resistor using mesh analysis. 10