SEM-III (R) ETRX – ENABS

Con. 4773-12.

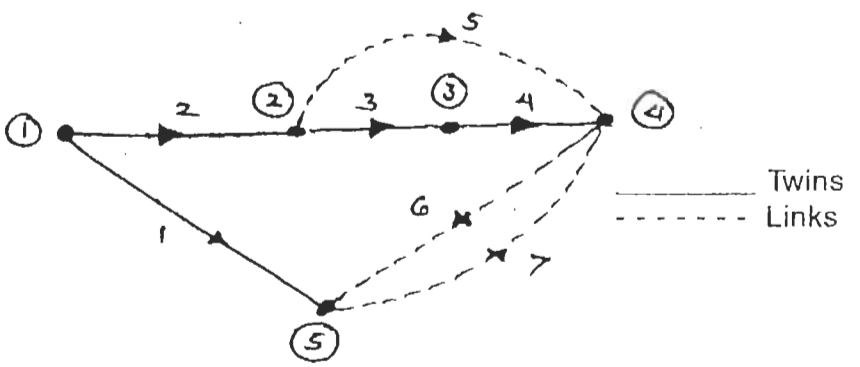
GN–9320

(3 Hours) **[Total Marks : 100**

N.B.: (1) Question No. 1 is **compulsory** and solve any **four** questions out of remaining **six**.
(2) Assume suitable **data** if **necessary** and mention that **assumption** while solving that questions.
(3) **Figures** to the **right** indicate **full** marks.

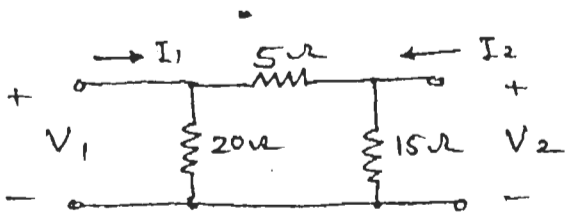
1. Any **five** :— 20

(a) Following is a tree of graph (shown with firm lines) shown in linear graph of a network obtain fundamental cutset matrix.

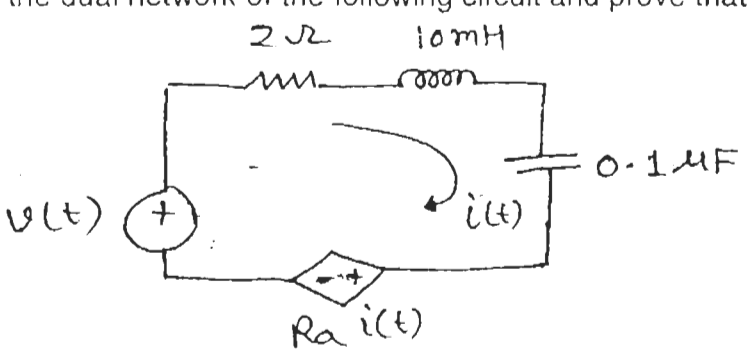


(b) What are the conditions for a rational function F(s) with real coefficients to be "positive real function ? "

(c) Find the Z-parameters for the circuit shown.



(d) Draw the dual network of the following circuit and prove that it is a dual one.

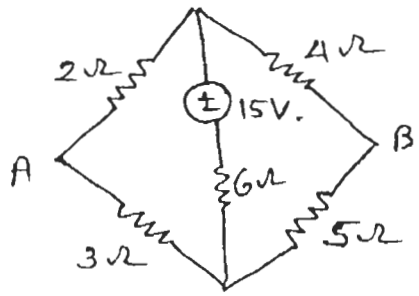


[TURN OVER

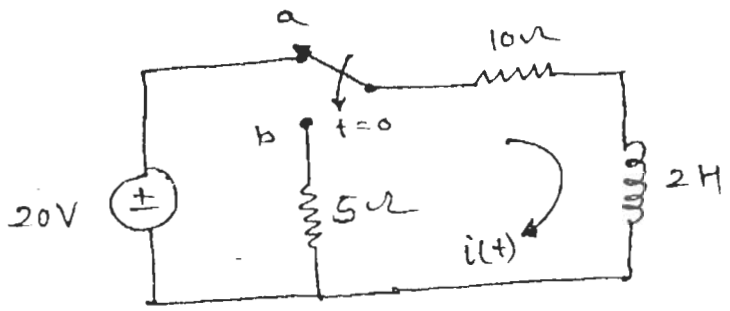
(e) For the network shown find :—

(i) Power from voltage source

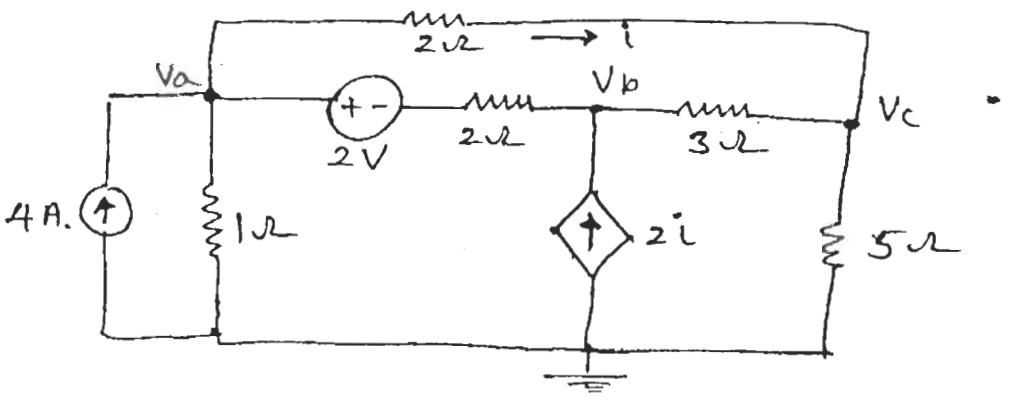
(ii) Voltage across A–B.



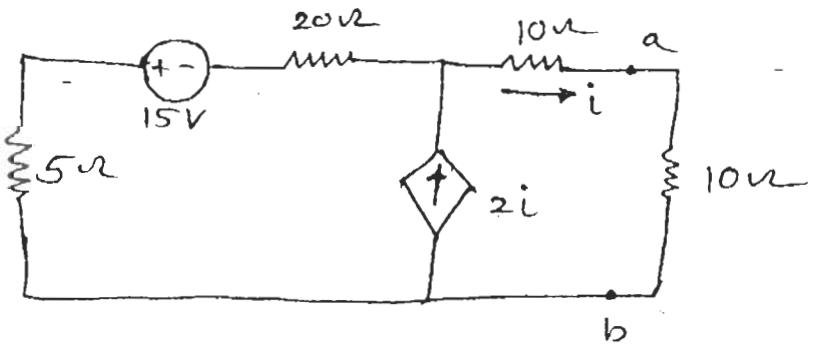
(f) The circuit is operating under steady state condition when switch is at position 'a' of at t = 0, the switch is moved to position 'b'. Determine current I(s) and i(t).



2. (a) Find V_a, V_b and V_c using Nodal Analysis. 10



(b) Find the Norton's equivalent circuit across terminals a–b of given circuit and hence the power discipated in 10Ω resistor. 10



3. (a) State giving appropriate reasons whether the following functions are "positive real functions." **10**

(i) $F(s) = \dfrac{2s^3 + 2s^2 + 3s + 2}{s^2 + 1}$

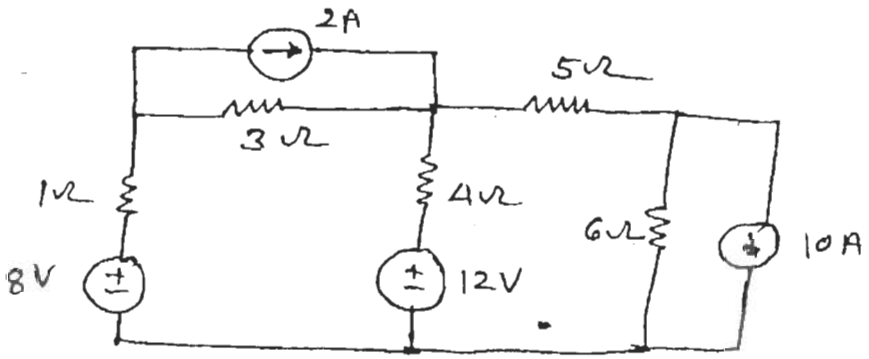
(ii) $Y_2(s) = \dfrac{s^3 + 5s}{s^4 + 2s^2 + 1}$

(b) Realise :— **10**

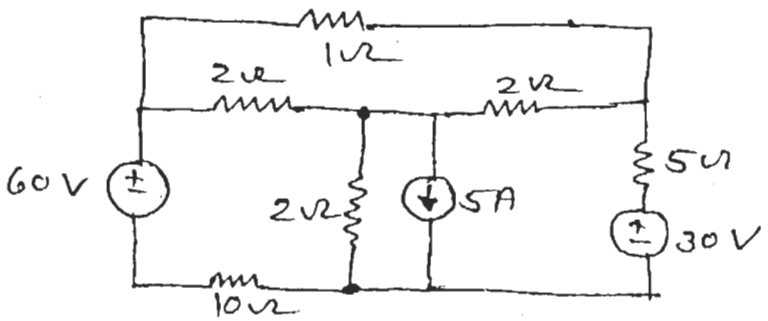
(i) $Y(s) = \dfrac{s^4 + 6s^2 + 4}{2s^3 + 4s}$ in Cauer II form.

(ii) $Z(s) = \dfrac{4(s^2 + 1)(s^2 + 16)}{s(s^2 + 4)}$ in Foster I form.

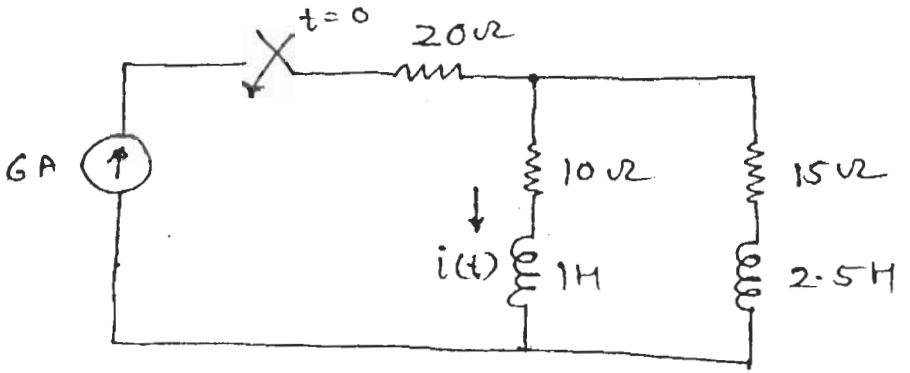
4. (a) For the network shown find branch currents and branch voltages using loop current analysis. This is to be solved by graph theory. **10**



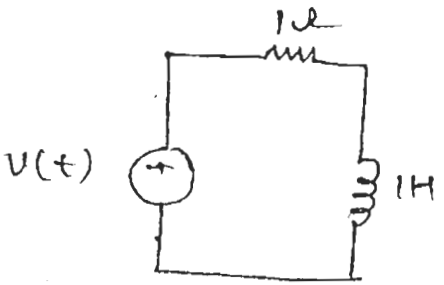
(b) Graph of a given network is to be drawn. Also find Aa, A, B and Q matrices for the same. How many trees are possible in the above graph ? **10**

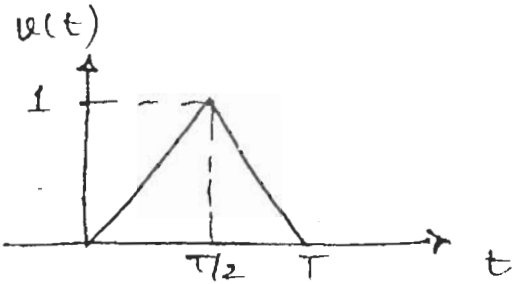


5. (a) Using Laplace transform find i(t) if the switch is closed at t = 0. Assume initial conditions to be zero. 10

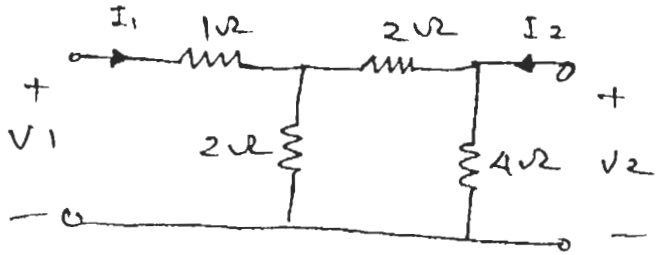


(b) A triangular voltage pulse of duration T and peak value unity is switched in to a series RL circuit which is initially relaxed. Determine i(t). 10





6. (a) Two identical sections of this network are in parallel. Obtain Y-parameters for connected network. 10



(b) Define ABCD parameters and relate them to other parameters as indicated. 10

(i) A and C in terms of Z
(ii) B in terms of Y
(iii) D in terms of H.

Con. 4773-GN-9320-12. 5

7. (a) A series R–L circuit with R = 10Ω and L = 1H is applied with constant 20V voltage at t = 0. Find the time at which $V_R = V_L$. **10**

   (b) Find i, $\frac{di}{dt}$, $\frac{d^2i}{dt}$ at $t = 0^+$ in the following network when the switch is changed from position 1 to 2 at t = 0. Steady state condition reached before switching. **10**