S.E. (Electronics & Biomedical) (Sem. III) (Rev) May 07
Sub. Electrical Network Analysis & Synthesis
12/06/07.

ND-9464

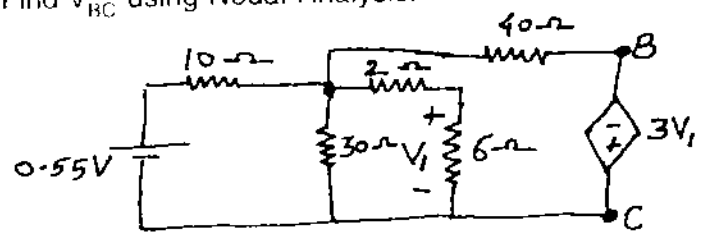
333-07. (REVISED COURSE)

(3 Hours) [Total Marks : 100

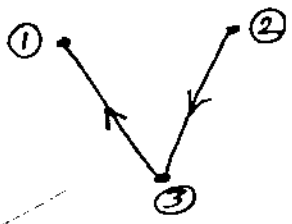
Question No. **1** is **compulsory**.
Attempt any **four** out of the remaining **six** questions.
Assume **suitable** data if **required**.
Figures to the **right** indicate **full** marks.

Solve the following questions :— **20**

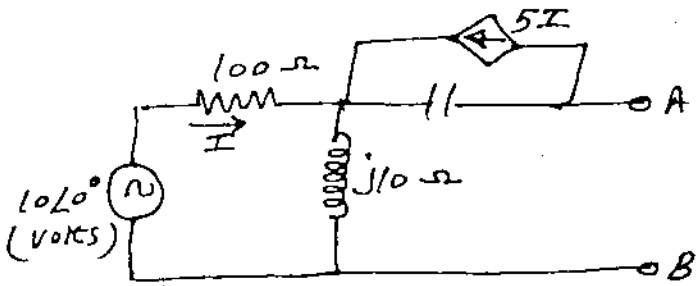
a) Find V_{BC} using Nodal Analysis.



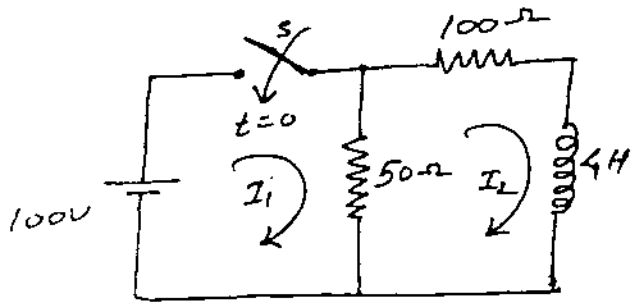
b) Following is tree of graph. Draw the complete oriented graph and draw one appropriate electrical network for it.



c) Find Thevenin's equivalent circuit of following network across A – B.

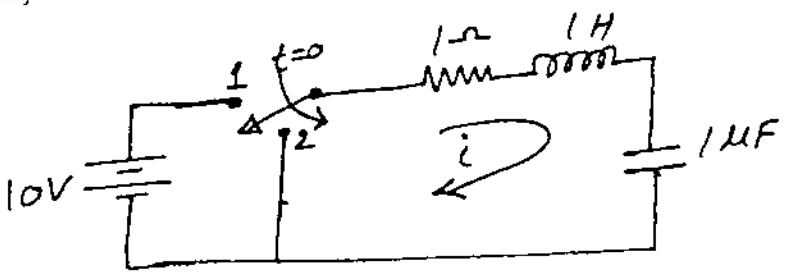


d) In the following network, the initial current is zero. Find the source current after closing the switch.

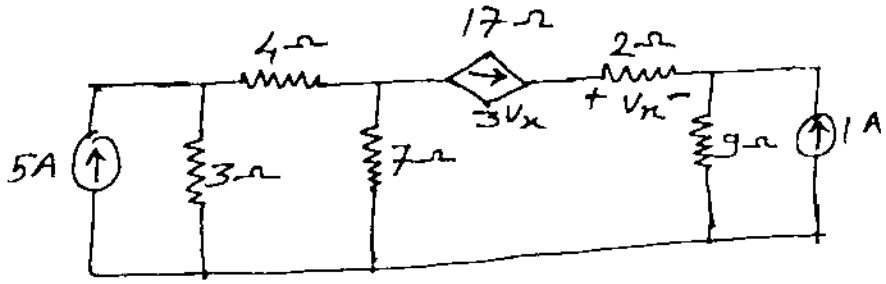


[TURN OVER

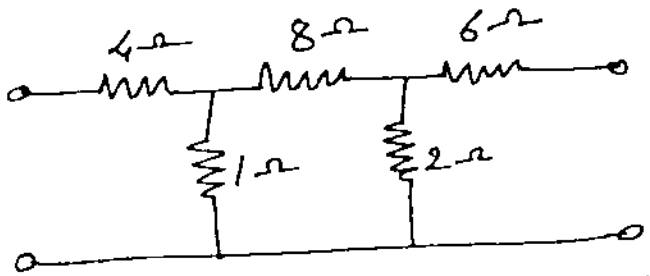
2. (a) Find i, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ and $\frac{d^3i}{dt^3}$ at t = 0+ in the following network when the switch is chang from position 1 to position 2 at t = 0.
Steady state condition is reached before switching.



(b) Calculate the current through 2 Ω resistance using Source Transformation.



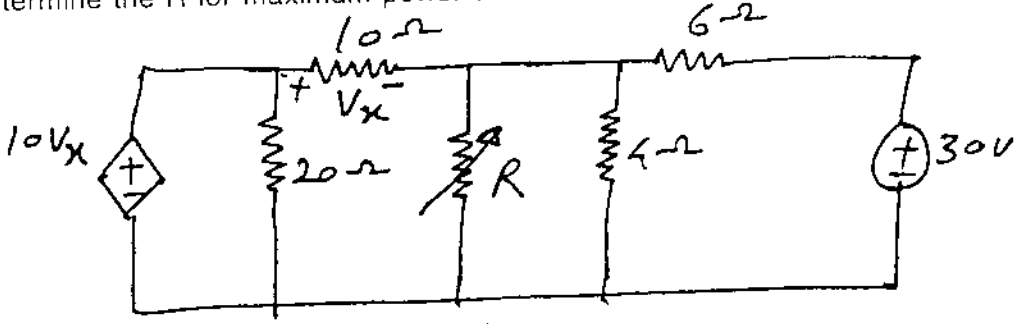
3. (a) Find the transmission parameters for the network shown :—



(b) Synthesise the following function in Foster–I and Foster–II form.

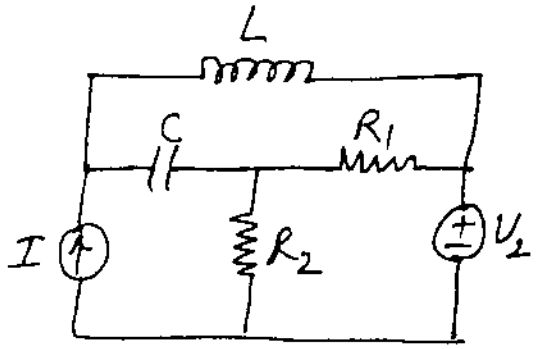
$$Z(s)=\frac{\frac{16}{3}\left(s^2+4s+3\right)}{\left(s^2+2s\right)}$$

4. (a) Determine the R for maximum power transferred. Hence determine P_{max}.



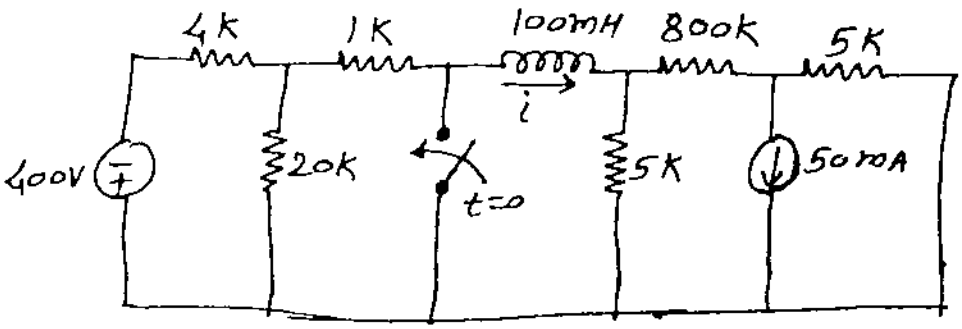
For the network shown below, find — 10

(i) Incidence matrix
(ii) Cut-set matrix
(iii) Tie-set matrix.

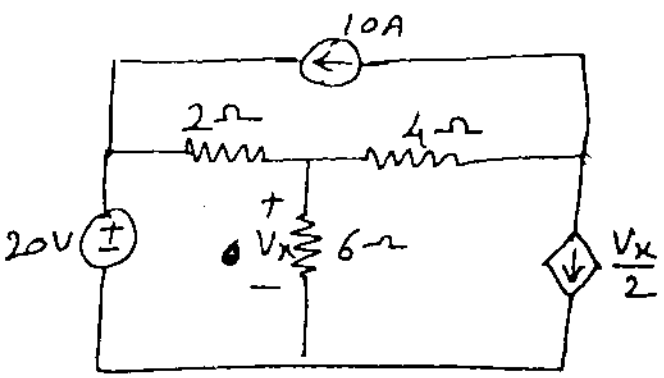


Switch S is open for a long time and closes at t = 0, find — 10

(i) Initial value of current i
(ii) i(t) for $t \geq 0$.



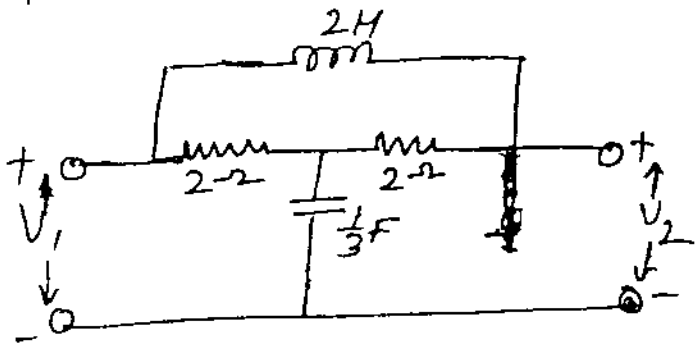
Using superposition theorem, find V_x — 10



Check following function for positive real function — 8

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

(b) Determine Y-parameters for n/w shown below :—



(c) Realise $Y(s) = \frac{s^4 + 6s^2 + 4}{2s^3 + 4s}$ in Cauer–II form.

7. Attempt the following questions :—
   (a) Explain the principle of duality. Explain it's procedure to find the dual network with suitable example.
   (b) Explain in detail the properties of positive real functions.
   (c) Prove the condition for Reciprocity and Symmetry.
