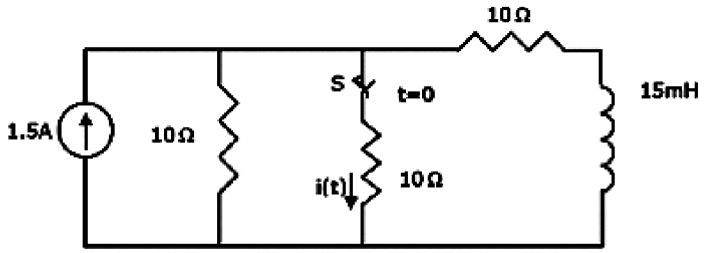
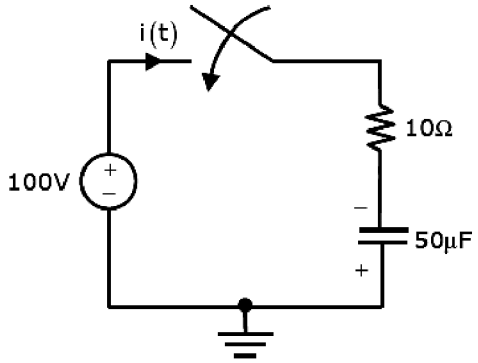


(b) In the circuit shown below, the initial charge on capacitor is 2.5 mC, with voltage polarity as indicated. The switch is closed at time t = 0. The current $i(t)$ at a time 't' after switch is closed. **7.5**



Section C

5. (a) Derive condition for symmetry and reciprocity in h-parameter representation. **7.5**

Sep-21-00034

B. Tech. EXAMINATION, 2021

Semester III (CBCS)

NETWORK ANALYSIS AND SYNTHESIS

(ECE, EE, EEE)

EC-303

Time : 2 Hours *Maximum Marks : 60*

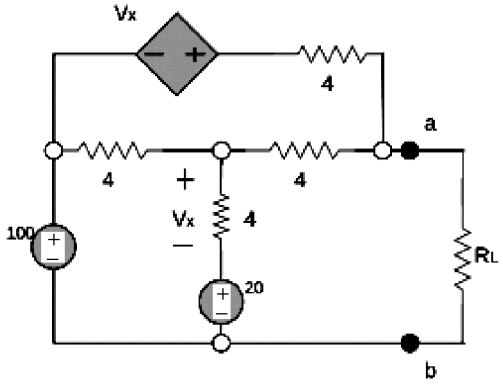
The candidates shall limit their answers precisely within 20 pages only (A4 size sheets/assignment sheets), no extra sheet allowed. The candidates should write only on one side of the page and the back side of the page should remain blank. Only blue ball pen is admissible.

Note : Attempt *Four* questions in all, selecting *one* question from any of the Sections A, B, C and D. Q. No. **9** is compulsory.

Section A

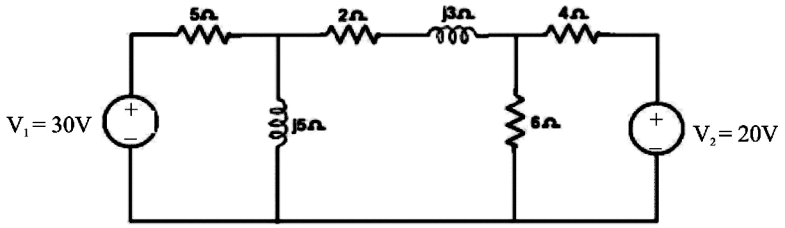
1. (a) Explain and prove Thevenin's theorem. **7.5**

(b) Find the load resistance R_L that enables the circuit (left of the terminals a and b) to deliver maximum power toward the load. Also, find the maximum power delivered to the load. **7.5**



2. (a) Define tree, co-tree, loop, branch, cut-set matrix, incidence matrix. **7.5**

(b) By using superposition theorem, calculate the current through the $(2+3j)\Omega$. **7.5**



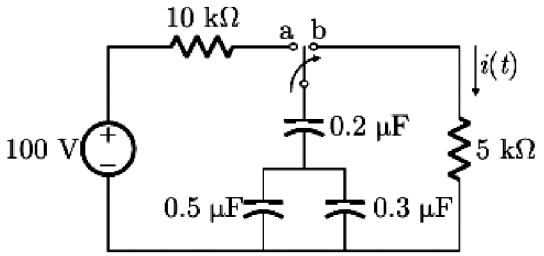
Section B

3. (a) Find inverse Laplace transform of :

$$F(s)=\frac{1}{(s-4)(s+2)(s-1)}$$

if it represents impulse response of causal system and absolutely integrable. **7.5**

(b) The switch in the circuit was in position '*a*' for long time and is move to position '*b*' at time $t = 0$, the current $i(t)$ for $t > 0$ is given by :



7.5

4. (a) In the circuit shown ahead, the switch 'S' is open for a long time and closed at $t = 0$. What is the current $i(t)$ for $t \geq 0^+$? **7.5**

(b) Obtain Z and Y parameters from given transmission parameters : $[T]=\begin{bmatrix}2 & 1\\ 3 & 5\end{bmatrix}$. **7.5**

6. Derive Y-parameters in terms of transmission, impedance and hybrid parameters. **15**

Section D

7. (a) Test whether the following function is positive real function :

$$F(s)=\frac{2s^4+7s^3+11s^2+12s+4}{s^4+5s^3+9s^2+11s+6}.$$ **7.5**

(b) Determine Foster and Cauer form of realization of the given driving point impedance function :

$$Z(s)=\frac{4\left(s^2+1\right)\left(s^2+9\right)}{s\left(s^2+4\right)}.$$ **7.5**

8. Synthesize first and second Foster and Cauer forms of the LC driving point impedance function :

$$Z_D(s)=\frac{\left(s^2+1\right)\left(s^2+16\right)}{s\left(s^2+4\right)}.$$ **15**

(Compulsory Question)

9. (a) Define KCL and KVL.

(b) Explain the concept of supernode.

(c) Define initial and final value theorem of Laplace transform.

(d) Explain reciprocity theorem.

(e) Define active and passive devices with example.

(f) Define dependent and independent sources.

2½×6=15