



**K. K. Wagh Institute of Engineering Education & Research, Nashik**  
(An Autonomous Institute From A.Y. 2022-23)

SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester:IV
Class:SY	Program:B.Tech
Branch Code:ELE	Pattern:2022
Name of Course:Electrical Network Analysis	Course Code:ELE222011
Max. Marks:60	Duration:2.30 Hrs.

**Instructions:** Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 03 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

**Question No. 1 Attempt following Question**

1a) Solve any one (6) CO1

a) State and explain Thevenin's Theorem.

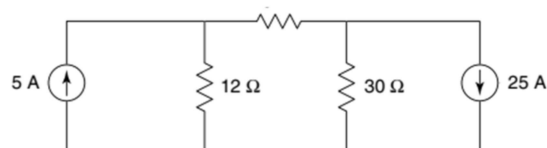
OR

b) Explain source transformation with suitable example.

**Question No. 2 Attempt following Question**

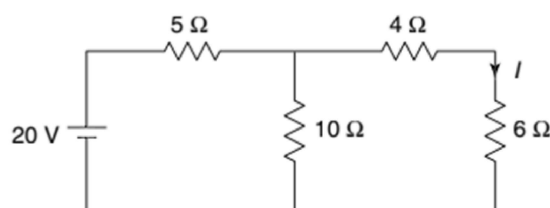
2a) Solve any one. (6) CO2

a) Find the current through 2 Ohm resistor using Superposition Theorem.



OR

b) Calculate current I and verify the Reciprocity theorem for the network shown in figure.

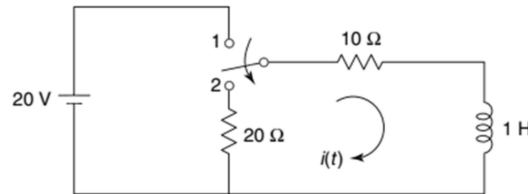


### Question No. 3 Attempt following Question

- 3a) Obtain the expression for current through inductor in series RL circuit connected to a. d. c. voltage  $V$  for  $t > 0$  (8) CO3  
using the Laplace transform. Assume initial current through inductor is zero.

OR

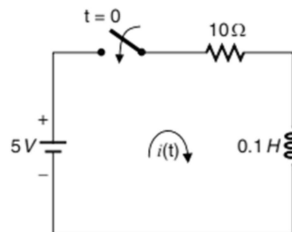
- 3b) In the network shown in figure, the switch is changed from the position 1 to the position 2 at  $t = 0$ , steady (8) CO3  
condition having reached before switching. Find the values of  $i$ ,  $\frac{di}{dt}$  and  $\frac{d^2i}{dt^2}$  at  $t = 0^+$



- 3c) Obtain the expression for voltage across capacitor in series RC circuit connected to a. d. c. voltage  $V$  for  $t > 0$ . (8) CO3  
Assume initial charge across capacitor is zero using Laplace transform.

OR

- 3d) In the RL circuit of figure, the switch is closed at  $t = 0$ . Find the current  $i(t)$  for  $t \geq 0$  using Laplace (8) CO3  
Transform.



### Question No. 4 Attempt following Question

- 4a) Explain the behaviour of R, L and C elements for transients. Mention the representation at the instant of (8) CO3  
switching.

OR

- 4b) What is time constant? Explain time constant in case of series R-L and series R-C circuit. (8) CO3

- 4c) Design a T-section high pass filter having a cut-off frequency of 10 kHz with a load resistance of 600 Ohm. (8) CO4

OR

- 4d) What is low pass filter? Derive the expression for the cut-off frequency of prototype low pass filter (8) CO4  
in terms of L and C.

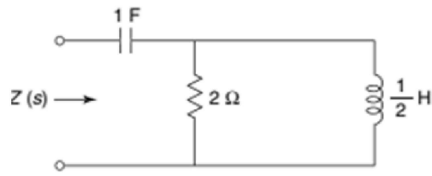
### Question No. 5 Attempt following Question

- 5a) What are open circuit parameters? Derive interrelation between 'Y' and 'Z' parameters. (8) CO5

OR

- 5b) What is pole-zero plot? Explain with suitable example. (8) CO5

- 5c) Find the poles and zeroes of the impedance of network shown in figure and plot them on s-plane. (8) CO5



**OR**

- 5d) Define various transfer functions for a two-port network hence obtain the pole-zero plot of the following functions (8) CO5

$$F(s) = \frac{s(s+2)}{(s+1+j1)(s+1-j1)} \quad F(s) = \frac{s(s+1)}{(s+2)^2(s+3)}$$

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