

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**  
(MID SEMESTER EXAMINATION MO/2024)

CLASS: BTECH  
BRANCH: EEE

SEMESTER : III  
SESSION : MO/2024

SUBJECT: EE205 CIRCUIT THEORY

TIME: 02 Hours

FULL MARKS: 25

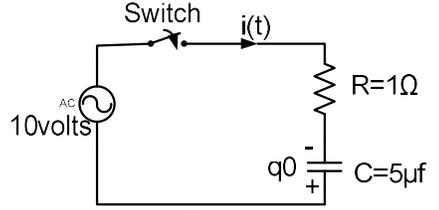
**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

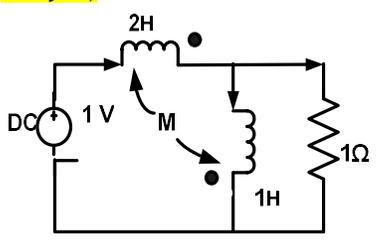
- |  |     |                     |                       |
|--|-----|---------------------|-----------------------|
| Q.1(a) Define 1) branch incidence 2) I-shift 3) cut set 4) twigs | [2] | CO<br>[CO1,<br>CO2] | BL<br>BL1, BL2        |
| Q.1(b) For the given cut set matrix obtain the oriented graph.   | [3] | [CO1,<br>CO2]       | BL1, BL2,<br>BL3, BL4 |

$$Q_f = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \end{matrix} & \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & -1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & 1 & -1 & 0 \end{bmatrix} \end{matrix}$$

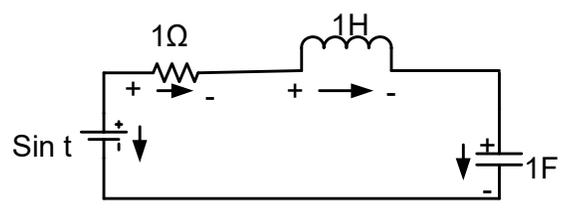
- |  |     |               |                  |
|--|-----|---------------|------------------|
| Q.2(a) Find $i(t)$ in figure given below switching at $t=0$ . Assume initial charge on capacitor $250 \mu$ coulombs. | [2] | [CO1,<br>CO2] | BL3, BL4,<br>BL5 |
|--|-----|---------------|------------------|



- |  |     |               |                   |
|--|-----|---------------|-------------------|
| Q.2(b) Draw the oriented graph for the circuit shown in figure and write the equilibrium equation when branch with 1H acting as twig. (With loop analysis) | [3] | [CO1,<br>CO2] | BL1, BL2,<br>BL3, |
|--|-----|---------------|-------------------|



- |  |     |               |                   |
|--|-----|---------------|-------------------|
| Q.3(a) State and explain the Reciprocity Theorem                                     | [2] | [CO1,<br>CO2] | BL1, BL2,<br>BL3, |
| Q.3(b) Verify the Tellegen's theorem for the network. Assume steady state condition. | [3] | [CO1,<br>CO2] | BL1, BL2,<br>BL3, |



Q.4(a) Define 1. Transfer function, 2. Driving point function

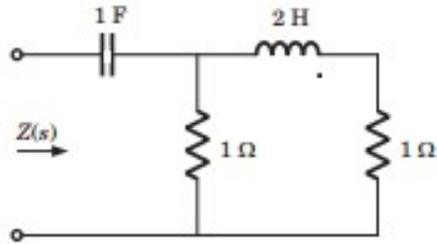
[2] [CO3]

BL3, BL4, BL5

Q.4(b) Determine the driving point impedance of the given network

[3] [CO3]

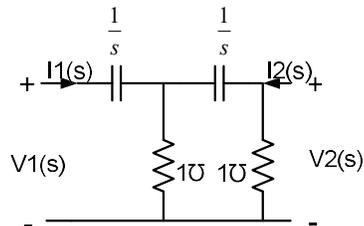
BL3, BL4, BL5



Q.5(a) Determine the transfer voltage ratio function of the given network (R in Ohm)

[2] [CO3]

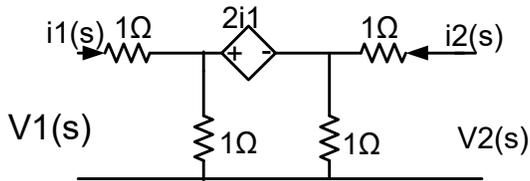
BL3, BL4, BL5



Q.5(b) Determine Short circuit admittance parameters of the circuit shown.

[3] [CO2, CO3]

BL3, BL4, BL5



.....23/09/2024.....E