

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

CLASS: BTECH
BRANCH: ECE/EEE

SEMESTER: III
SESSION : MO/2019

SUBJECT : EE205 CIRCUIT THEORY

TIME: 2.00 HOURS

FULL MARKS: 25

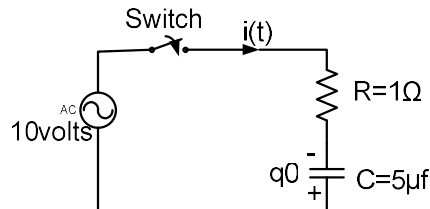
INSTRUCTIONS:

1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.

- Q1 (a) Define 1) I-shift 2) cut set 3) branch incidence 4) Isomorphic [2]
Q1 (b) For the given cut set matrix obtain the oriented graph. [3]

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

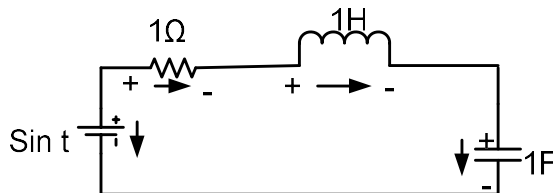
- Q2 (a) Find $i(t)$ in figure given below switching at $t=0$. Assume initial charge on capacitor 250 μ coulombs. [2]



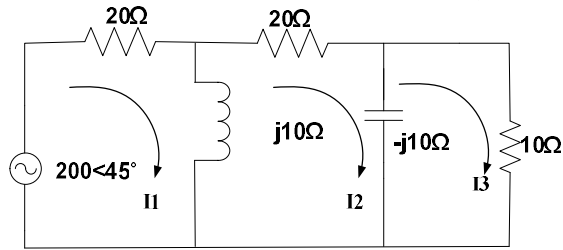
- Q2 (b) A reduced incidence matrix of linear graph is given below. Assume branch 2, 3, 4 are twigs. Determine B_f using **inter-relation** between matrices. And verify by drawing the graph. [3]

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

- Q3 (a) Verify the Tellegen's theorem for the network. Assume steady state condition. [2]

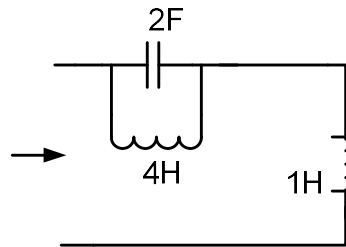


Q3 (b) The ladder network is shown below. Verify the reciprocity theorem for the circuit [3]

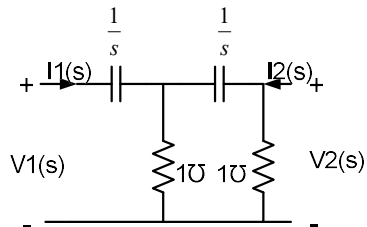


Q4 (a) Write the application and limitation of substitution theorem. [2]

Q4 (b) Find ONCF, SCNF and input impedance of the network shown in figure below [3]



Q5 (a) Determine the transfer voltage ratio function of the given network [2]



Q5 (b) Determine Short circuit admittance parameters of the circuit shown. [3]

