(END SEMESTER EXAMINATION)

CLASS: BTECH
BRANCH: EEE

SEMESTER : III
SESSION : MO/2022

SUBJECT: EE205 CIRCUIT THEORY

TIME: 3:00 Hours

FULL MARKS: 50

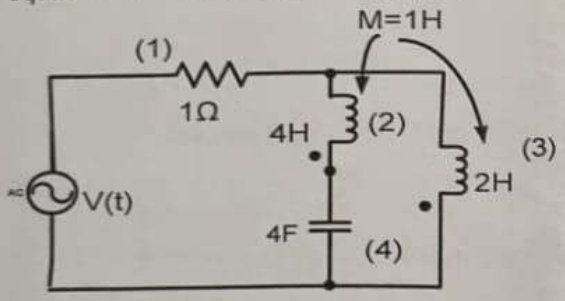
INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) i. Define 1) v-shift 2) f-loop 3) branch incidence 4) twigs [2+3]

ii. Branch current and loop current relation are expressed in matrix form as:

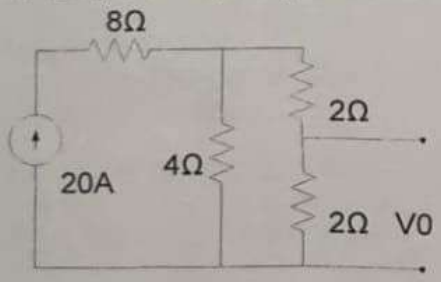
$$\begin{bmatrix} i_1 \\ i_2 \\ i_3 \\ i_4 \\ i_5 \\ i_6 \\ i_7 \\ i_8 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 & 0 \\ -1 & -1 & -1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & -1 \\ 1 & 1 & 0 & -1 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \\ I_4 \end{bmatrix}$$

Q.1(b) Draw the graph of the network shown in fig formulate the cutest matrix, write the equilibrium equation in matrix form on node basis [5]



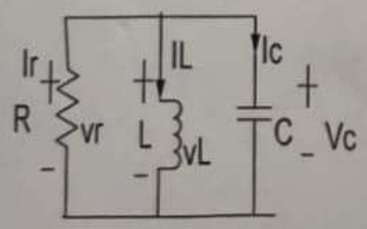
Q.2(a) i. Prove the Tellegen's Theorem for K^{th} branch [2+3]

ii. Verify the reciprocity theorem for the circuit shown below.



Q.2(b) Prove the property of STM $\phi(t_2 - t_1)\phi(t_1 - t_0) = \phi(t_2 - t_0)$ for any t_0, t_1, t_2 [2+3]

Obtain the state equation for the zero input networks shown in fig state variables are I_L and V_C



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