

END TERM EXAMINATION

FOURTH SEMESTER [B. TECH] JUNE 2024

Paper Code: EEC-208

Subject: Circuits and Systems

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit.

Q1 Attempt all questions:

- a) Find the Fourier transform for $x(t) = \sin(\omega_c t) u(t)$ (3)
- b) List the properties of ROC. (3)
- c) Determine the impulse response of series and parallel RL circuit. (3)
- d) Explain the AC circuit containing the inductor only. (3)
- e) Explain short circuit and open circuit impedance in terms of ABCD parameters. (3)

UNIT-I

Q2 Examine the following system: Linear/Nonlinear, Causal/Non- Causal, Time Variant/Time-Invariant, and Static/Dynamic with examples. (15)

Q3 Find the laplace transform for following signals if $x(t) = e^{-4t} u(t)$. (5×3=15)

- i) $y(t) = x(t + 2)$
- ii) $y(t) = t x(t)$
- iii) $y(t) = dx(t)/dt$

UNIT-II

Q4 a) Derive the Transient Response in series R-L-C circuit with sinusoidal excitation for second order circuit. (7)

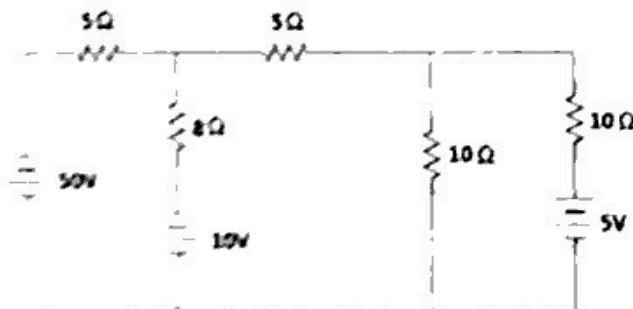
b) A step voltage of 20 V is applied at $t = 0$ in an R-L-C series circuit where $R = 5\Omega$, $L = 1H$ and $C = 1F$. Calculate $i(t)$ with and without Laplace Transform. (8)

Q5 a) Find the step response (by applying a constant voltage source at the close of a switch) of a Parallel RLC circuit. (8)

b) Determine the step response of series and parallel RC circuits. (7)

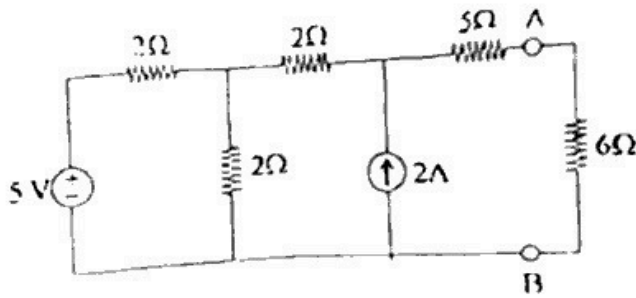
UNIT-III

Q6 For the Circuit shown below, determine the current in each branch using Nodal and Loop analysis. (15)



P.T.O.

- Q7 Determine the value of current in 6Ω resistor using Thevenin's theorem and Norton's theorem. (15)



UNIT-IV

- Q8 a) Explain the term 'tie-set' and 'tie-set matrix' of a network with an illustrative example. (5)
 b) Derive and prove the following Matrix Equation with an appropriate example

$$I_b = B^T I_L$$

Where, B is the Tie-set matrix, I_b and I_L are the branch current respectively (10)

- Q9 a) Derive the transmission parameters of Two-port networks. Also, determine the condition of Reciprocity and symmetry for ABCD parameter. (8)
 b) Explain the parallel and cascade connection of Two-port networks. (7)
