

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations Decemembr-2025
NETWORK ANALYSIS

(Electronics and Communications Engineering)

Time: 3 Hours

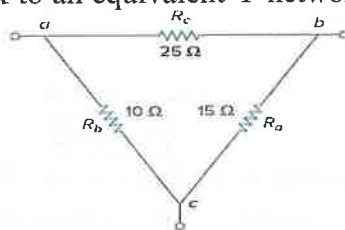
Max. Marks: 70

PART-A

(Answer all the Questions $10 \times 2 = 20$ Marks)

- 1 a Define statement of Milliman's theorem.
- b Define statement of Substitution theorem.
- c State Initial value theorem.
- d Define Laplace transform of a function $f(t)$
- e Draw equivalent circuit of a pure inductor connected to a sinusoidal supply in frequency domain.
- f Convert the Δ network to an equivalent Y network.

CO1	L1	2M
CO1	L1	2M
CO2	L1	2M
CO2	L1	2M
CO3	L2	2M
CO3	L3	2M



- g Define Mutual inductance.
- h Define Bandwidth
- i What is the condition for Reciprocity in Z and Y parameters?
- j Define Two-port network

CO4	L1	2M
CO4	L1	2M
CO5	L1	2M
CO5	L1	2M

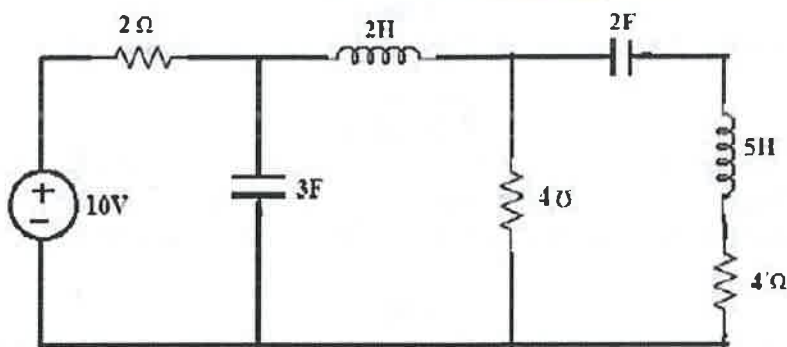
PART-B

(Answer all Five Units $5 \times 10 = 50$ Marks)

UNIT-I

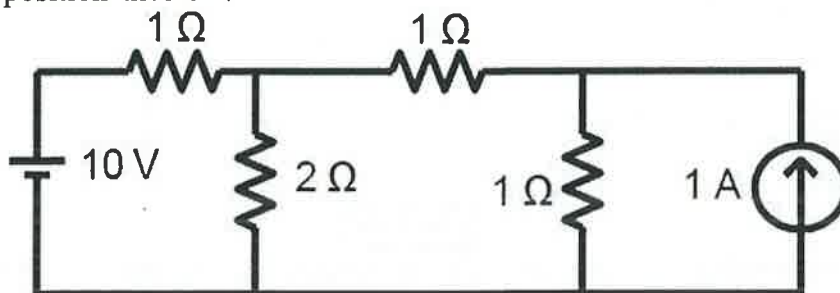
- 2 a Draw the dual circuit for given circuit below

CO1 L1 5M



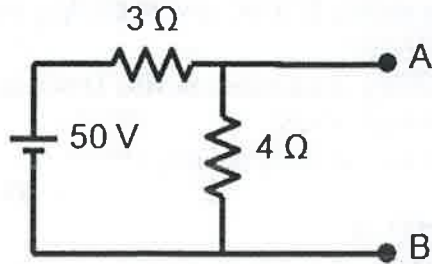
- b Calculate the current in 2Ω resistor in the given circuit using Super position theorem.

CO1 L3 5M

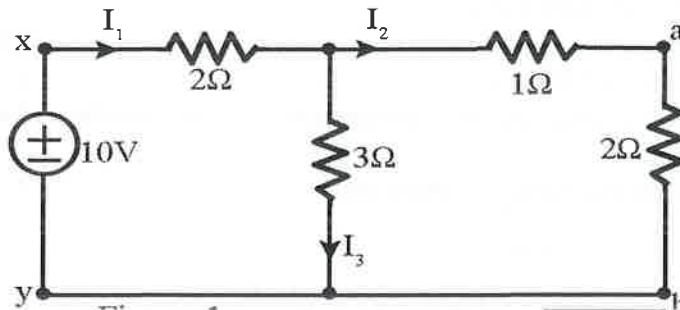


OR

- 3 a Find the Thevenin's equivalent circuit across AB for the given circuit. CO1 L3 5M

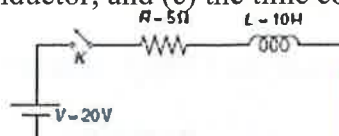


- b Verify Reciprocity theorem for the network shown in below figure. CO1 L3 5M



UNIT-II

- 4 a A DC voltage of 20 V is applied in an R-L circuit where $R = 5\Omega$ and $L = 10H$. Calculate (a) the current i ; (b) voltage across resistor and voltage across the inductor; and (c) the time constant. CO2 L3 5M



- b Evaluate the given function using partial fractions expansion. CO2 L3 5M

$$L^{-1} \left[\frac{1}{(s-1)(s^2+1)} \right]$$

OR

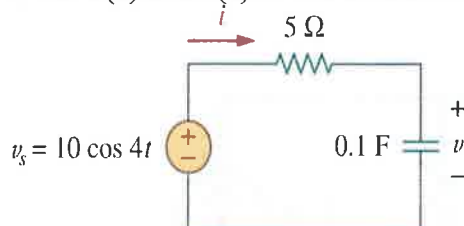
- 5 Derive the expression for current in R-C series circuit having DC excitation. CO2 L2 10M

UNIT-III

- 6 The impedance of a parallel circuit are $Z_1 = (6+j8)\Omega$ and $Z_2 = (8-j6)\Omega$. If the applied voltage is 120V, find (i) Current and power factor of each branch (ii) Total current and over all power factor (iii) power consumed by each impedance CO3 L3 10M

OR

- 7 a Explain the phasor relation for R, L, C elements CO3 L1 6M
b Find $V(t)$ and $i(t)$ in the circuit shown in figure below CO3 L3 4M

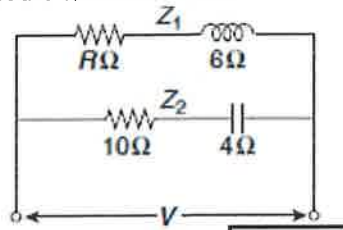


UNIT-IV

- 8 Derive the relationship between the self inductance L_1 , L_2 and mutual inductance M of two coupled coils. CO4 L2 10M

OR

- 9 a Derive an equation for the Q-factor of a series resonant circuit in terms of R , L and C CO4 L2 5M
- b A parallel circuit is shown in Figure. Calculate the value of R in the circuit for which the circuit will resonate. CO4 L3 5M



UNIT-V

- 10 The hybrid parameters of a two-port network are, $h_{11}=1K\Omega$, $h_{12}=0.003$, $h_{21}=100$ and $h_{22}=50\mu S$. Find Z-parameters of the network CO5 L3 10M

OR

- 11 a Derive the expressions for Y-parameters in terms of ABCD parameters CO5 L2 5M
- b Find the Z-parameters of the network shown in below figure. CO5 L3 5M

