

B.Tech I Year II Semester (R15) Regular & Supplementary Examinations May/June 2017

NETWORK ANALYSIS

(Common to ECE & EIE)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

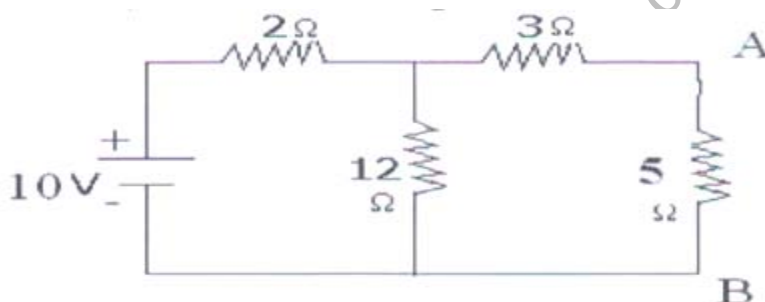
- 1 Answer the following: (10 X 02 = 20 Marks)
 - (a) Write short notes on source transformation.
 - (b) State Kirchhoff's laws.
 - (c) When an inductor is connected in a circuit, what is the status of inductor under steady state condition? Draw the equivalent circuit?
 - (d) When a capacitor is connected in a circuit, what is the status of capacitor under steady state condition? Draw the equivalent circuit?
 - (e) Define power factor and complex power.
 - (f) Define impedance and apparent power.
 - (g) What is the power factor in the series R-L-C circuit at resonance? What is the reason for that?
 - (h) What is Q-factor?
 - (i) Define hybrid parameters.
 - (j) Draw constant-k low pass filter (proto type).

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

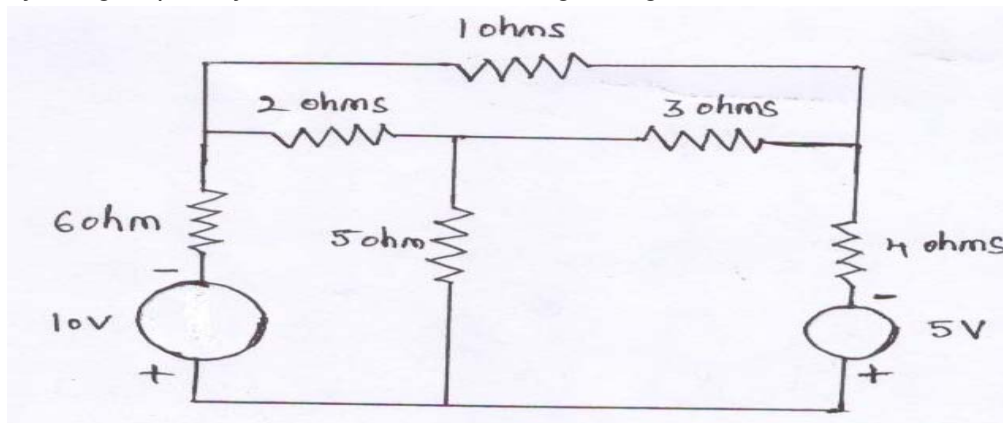
UNIT – I

- 2 (a) State and explain Millman's theorem.
(b) By using Thevenin's theorem, determine the current through 5 Ω resistor (All resistances are in Ω) as shown in figure.



OR

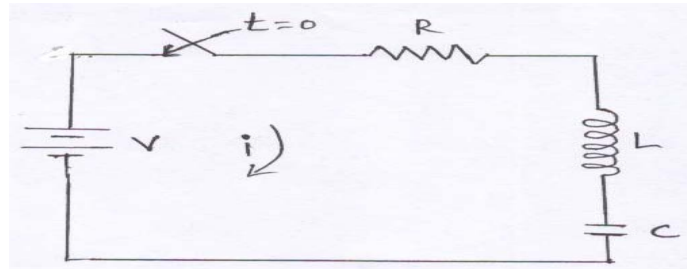
- 3 (a) State and explain Maximum power transfer theorem.
(b) By using loop analysis find the current flowing through 5 ohms resistor.



Contd. in page 2

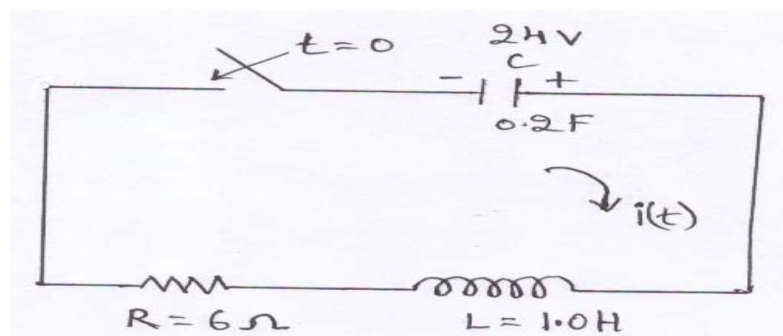
UNIT – II

- 4 In the circuit shown below, $V = 10 \text{ V}$, $R = 10 \Omega$, $L = 1 \text{ H}$ and $C = 10 \mu\text{F}$. The capacitor is initially uncharged. The switch is closed at $t = 0$. Determine $i(0^+)$, $\frac{di}{dt}(0^+)$ and $\frac{d^2i}{dt^2}(0^+)$. And also derive the formulae used.



OR

- 5 In the circuit shown below, $L = 1 \text{ H}$, $R = 6 \Omega$ and $C = 0.2 \text{ F}$. The capacitor is initially charged to 24 V and the switch is closed at $t = 0$. Determine the expression for $i(t)$ and the value of current at one second after the switch is closed. And also derive the formulae used.



UNIT – III

- 6 (a) Show that the power dissipated by a pure, capacitor excited by a sinusoidal voltage source is zero.
(b) A series circuit consisting of a 10Ω resistor, a $100 \mu\text{F}$ capacitance and a 10 mH inductance is driven by a 50 Hz AC voltage source of maximum value 100 V . Calculate the equivalent impedance, current in the circuit, the power factor and power dissipated in the circuit.

OR

- 7 (a) Derive the expression for instantaneous power when a series R-L circuit excited by a sinusoidal source.
(b) A series circuit to which 100 V is applied, consists of a 10Ω resistance, a 5Ω condenser and a resistor R in which 50 watts are lost and a reactance X_L which absorbed a reactive power of 100 VAR . Calculate the values of R and X_L that satisfy the stated conditions.

UNIT – IV

- 8 (a) Explain in detail about linear transformer.
(b) Show that $Q_0 = \omega_0 L / R = f_0 / BW$ for a series RLC circuit.

OR

- 9 (a) Show that the resonant frequency ω_0 of an RLC series circuit is the geometric mean of ω_1 and ω_2 , the lower and upper half power frequencies respectively.
(b) Given a series RLC circuit with $R = 100 \text{ ohms}$, $L = 0.5 \text{ H}$ and $C = 40 \mu\text{F}$. Calculate the resonant, lower and upper half – power frequencies.

UNIT – V

- 10 (a) Define and explain short circuit parameters by taking one example.
(b) A low pass π section filter consists of an inductance of 25 mH in the series arm and two capacitors of $0.2 \mu\text{F}$ in the shunt arms. Calculate the cut off frequency, design impedance, attenuation at 5 kHz and phase shift at 2 kHz . Also find the characteristic impedance at 2 kHz .

OR

- 11 (a) Derive the relation between transmission and impedance parameters.
(b) A T-section low pass filter has an inductance of 30 mH in each of the series arms and a shunt arm capacitance of $0.25 \mu\text{F}$. Calculate the cut off frequency, characteristic impedance, ratio of input, output voltages and phase shift at: (i) 1 kHz . (ii) 5 kHz .