Code: 15A04201 **R15**

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)

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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).

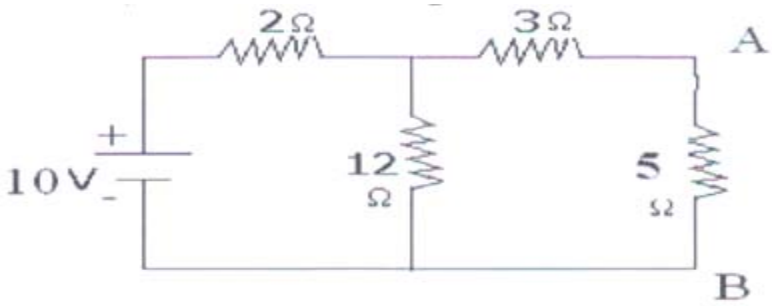
PART – B

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

UNIT – I

2 (a) State and explain Millman's theorem.

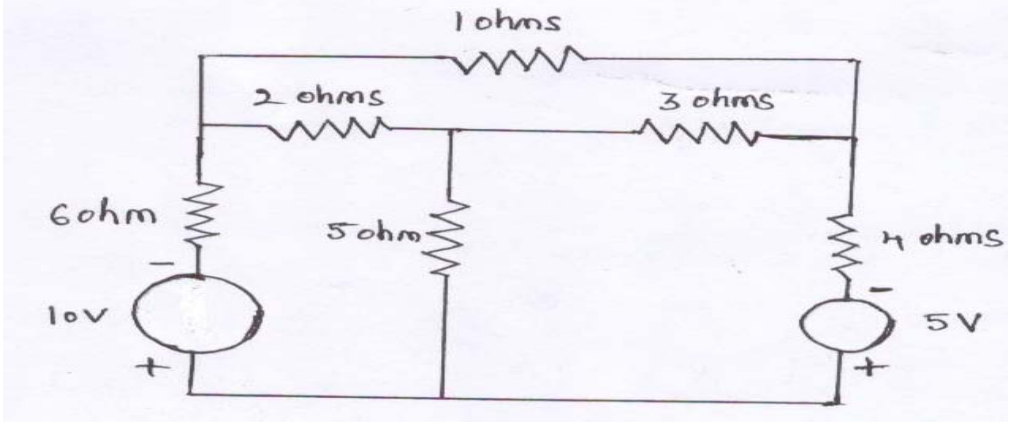
(b) By using Thevenin's theorem, determine the current through 5 Ω resistor (All resistances are in Ω) as shown in figure.



OR

3 (a) State and explain Maximum power transfer theorem.

(b) By using loop analysis find the current flowing through 5 ohms resistor.



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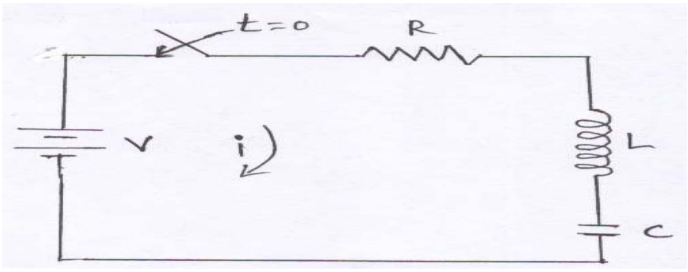
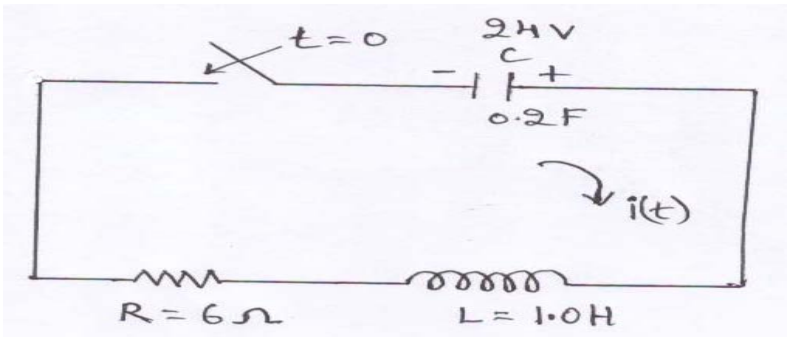
UNIT – II

4 In the circuit shown below, V = 10 V, R = 10 Ω, L = 1H and C = 10 μF. 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= 1H, R = 6 Ω and C = 0.2F. 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 10 Ω resistor, a 100 μF capacitance and a 10mH 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 10 Ω resistance, a 5 Ω 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 ohms, L = 0.5H and C = 40 μF. 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 25mH in the series arm and two capacitors of 0.2 μF 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 30mH in each of the series arms and a shunt arm capacitance of 0.25 μF. Calculate the cut off frequency, characteristic impedance, ratio of input, output voltages and phase shift at: (i) 1 kHz. (ii) 5 kHz.

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