

This question paper contains 4 printed pages.

Your Roll No.

Sl. No. of Ques. Paper : 8306 C
Unique Paper Code : 222171
Name of Paper : ELPT-101: Network Analysis
Name of Course : B.Sc. Applied Physical Science (Electronics) Part I
Semester : I
Duration : 3 hours

Maximum Marks : 75

Attempt any five questions. All questions carry equal marks.

Use of calculator / logarithmic tables is permitted.

1(a) The equation of an ac is

$i = 100 \sin 50\pi t$ amp. What are the frequency and the peak value of the current?

Also find the average and RMS value for $0 \leq t \leq 0.05$ sec. (7)

(b) Carry out the calculation and express the result in

i) Polar form for:

$$(2 + 3j)(1 - 2j)$$

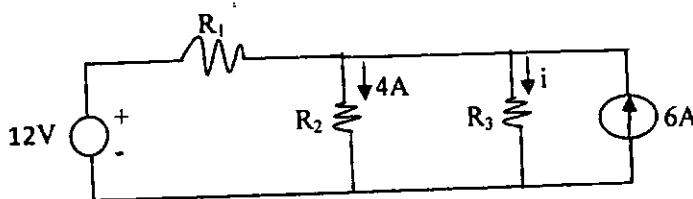
ii) Rectangular form for:

$$(4 \angle -60^\circ)(5 \angle 120^\circ) \quad (5)$$

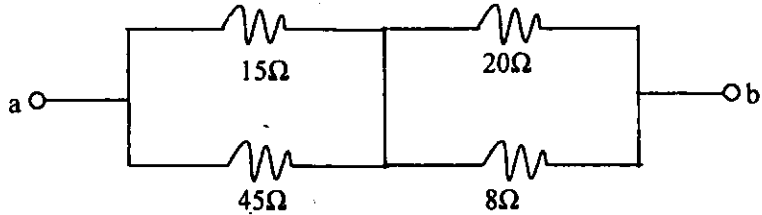
(c) What are the active and passive elements in a circuit. Give one example of each. (3)

2(a) State Kirchoff's current and voltage law. (3)

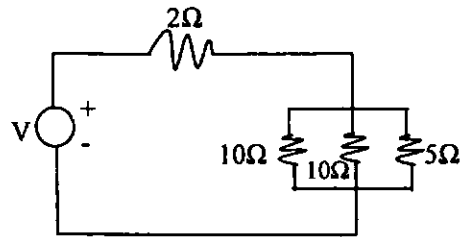
(b) For the circuit given below, compute the current through resistor R_3 if voltage source supplies a current of 8 A. (3)



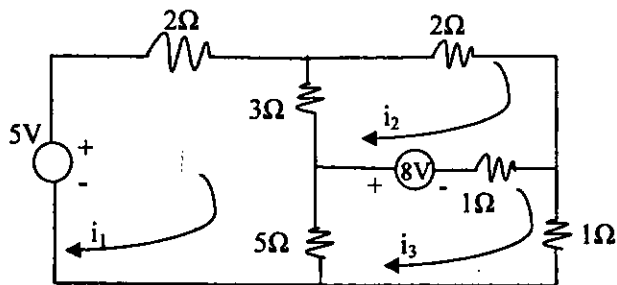
- (c) With the constant voltage applied to terminals ab, which resistor absorbs the highest power? (5)



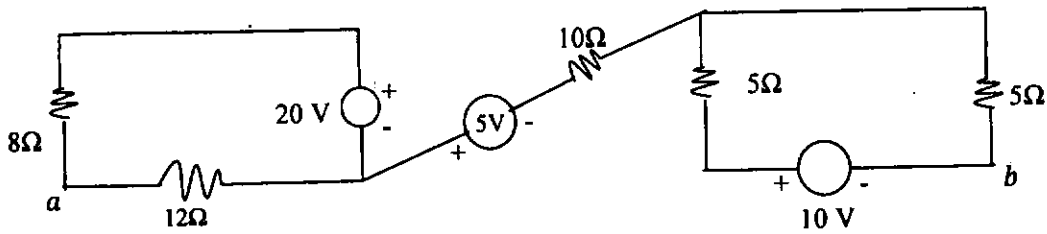
- (d) In the circuit shown below determine the constant voltage V if the current in the 5Ω resistor is 14 amperes. (4)



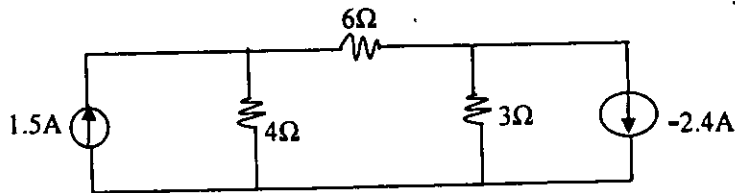
- 3(a) Identify the number of nodes and branches in the circuit given below. Also use mesh analysis to find the currents i_1 , i_2 and i_3 . (7)



- (b) Find voltage between point a and b: (3)

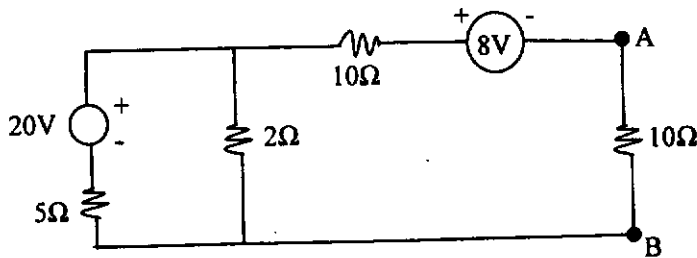


(c) Use node voltage method to find the current through 6Ω resistor (5)



4(a) State and prove maximum power transfer theorem. (5)

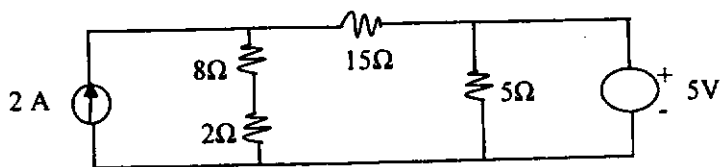
(b) Evaluate the current through 10Ω resistance by Thevenin's theorem and confirm the result by Norton's theorem for the given circuit



Find out the maximum power transferred to 10Ω load. (10)

5(a) State and prove superposition theorem. (8)

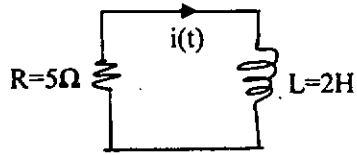
(b) Obtain the current in 15Ω resistor using superposition theorem (7)



6(a) Explain what is transient and steady state (2)

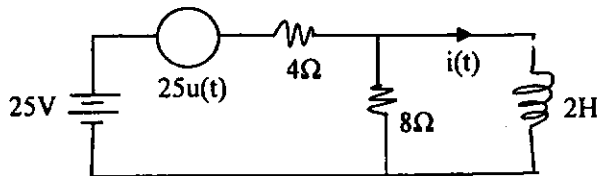
(b) Derive complete solution of current for a source driven RL series circuit. (8)

(c) Consider the circuit:



Find equation for $i(t)$ at a time $t = 12$ sec. Given initial current $i(t_0) = 2$ A. (5)

7(a) Find the complete response of the current for the circuit given below



Where $u(t)$ is the step function. (5)

(b) For a parallel source free RLC circuit, derive the conditions for over damped, critically damped and under damped response. (10)

8(a) Find two elements in a series circuit, given that the current and total voltages are: (4)

$$i = 10 \cos(2000t + 13.2^\circ)$$

$$v = 50 \cos(2000t + 45^\circ)$$

(b) Obtain the sum of the voltages: (3)

$$V_1 = 20 \cos(1000t - 40^\circ)$$

$$V_2 = 5 \cos(1000t + 130^\circ)$$

(c) For a parallel LCR circuit, with ac source, show that (8)

$$\text{Quality Factor} = \frac{\text{Resonant frequency}}{\text{Band width}}$$