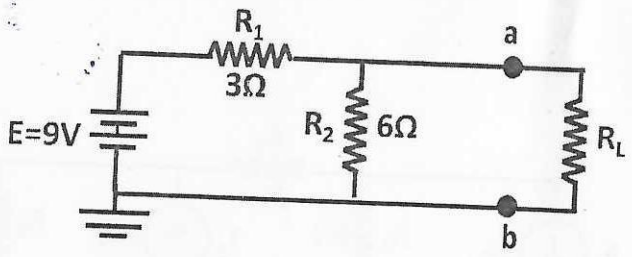


(5)

[This question paper contains 8 printed pages.]

Your Roll No. .....

Sr. No. of Question Paper : 1244 F

Unique Paper Code : 2222011203

Name of the Paper : Electrical Circuit Analysis (DSC-6)

Name of the Course : **B.Sc. (Hons.) Physics**

Semester : II

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. All questions carry **equal marks.**
3. **Question No. 1** is compulsory and attempt **any three** from the remaining four questions.
4. Use of non-programmable scientific calculator is allowed.

P.T.O.

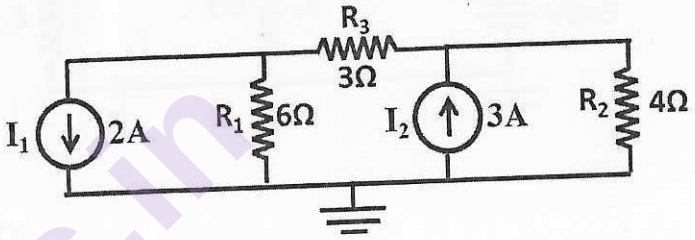
1. Attempt all questions. Each question carries equal marks. (3x5=15)

(a) Determine the form factor and peak factor for a half-rectified sinusoidal wave.

(b) What is the principle of duality in network analysis? How can it be used to solve problems in network analysis?

(c) Calculate average and rms values of the current, $i(t) = 10 + 10 \sin \omega t$.

(d) A 0.1 μF capacitor is first charged and then discharged through a 10MΩ resistor. Find the time in which the potential will fall off half of its maximum value.



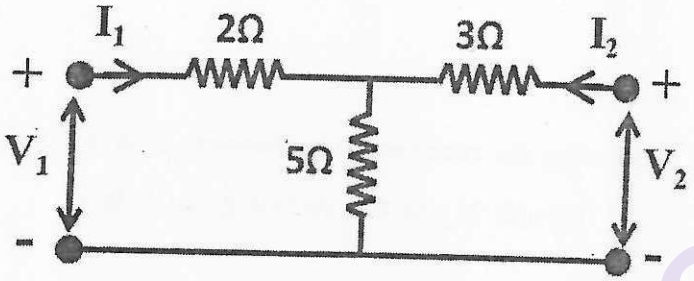
(5)

(b) A series RL circuit with R = 560 Ω and L = 350 mH is driven by a sinusoidal current source, $i(t) = 30 \cos(\omega t + 25^\circ)$ ampere, where $\omega = 1000$ rad/s. Find the voltage drop across R and L and the input voltage. (5)

(c) Find the Norton equivalent circuit at ab of the given network.

P.T.O.

(b) Determine the transmission parameters (ABCD) of the given network.



(7)

5. (a) Determine the voltage across R_3 resistor using the nodal analysis method.

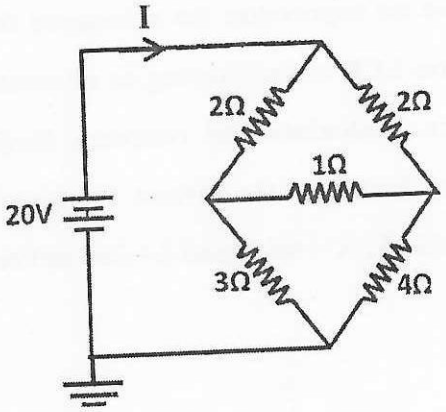
(e) Discuss briefly how a voltage source can be converted into a current source and vice-versa.

2. (a) Derive an expression for resonance frequency of a series LCR circuit having an alternating voltage source. Calculate the resonant frequency and quality factor of the circuit for given values of C = 550 nF, R = 60 Ω and L= 260 mH respectively. (8)

(b) A series LCR circuit with R= 6Ω, X_L=10Ω and X_c = 12 Ω is driven by a sinusoidal voltage source, v(t) = 20 cos (4000t) volts. Determine the equivalent impedance of the circuit. Also, draw its phasor diagram. (7)

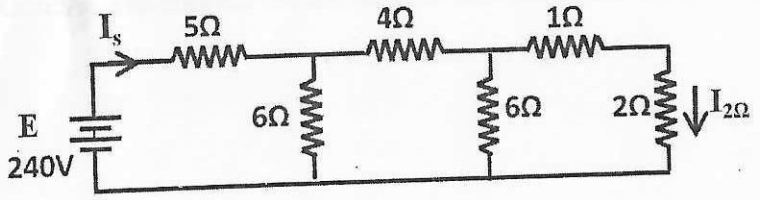
P.T.O.

3. (a) Determine the value of current I in the given diagram by using the Star-delta conversion method.



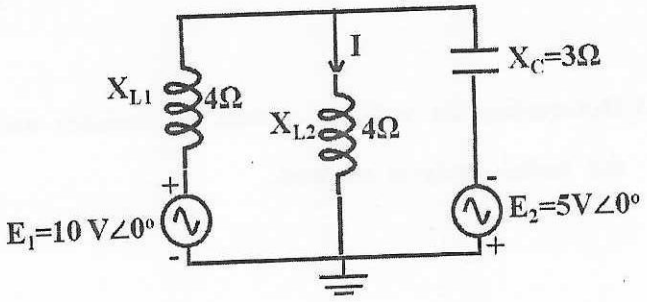
(8)

(b) Find out source current I_s and current through the resistance 2Ω ($I_{2\Omega}$) in the circuit given below.



(7)

4. (a) Using the superposition theorem, find the current I through X_{L2} in the circuit given below.



(8)