This question paper contains **4** printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **62**

Unique Paper Code : **222171** **G**

Name of the Paper : **Electronics–I Network Analysis (ELPT-101)**

Name of the Course : **B.Sc. Physical Science/Applied Physical Science**

Semester : **I**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any *five* questions.

All questions carry equal marks.

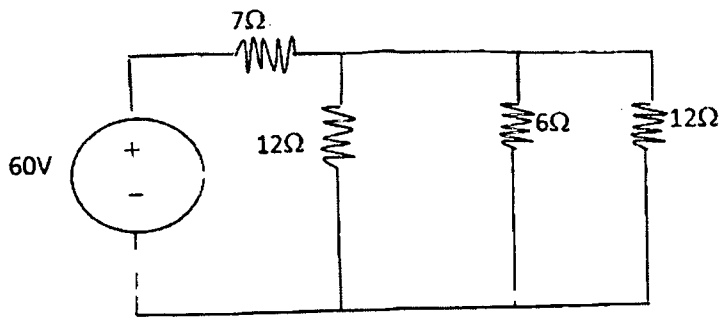
1. (*a*) Find the effective value of the function :

$$y = 50 + 30 \sin \omega t .$$ 4

(*b*) State and explain Kirchhoff's current law in detail. 7

(*c*) What are the active and passive elements in the circuit ? Give *one* example of each. 4

2. (*a*) Find the current supplied by the 60 V source using the mesh current method. 6

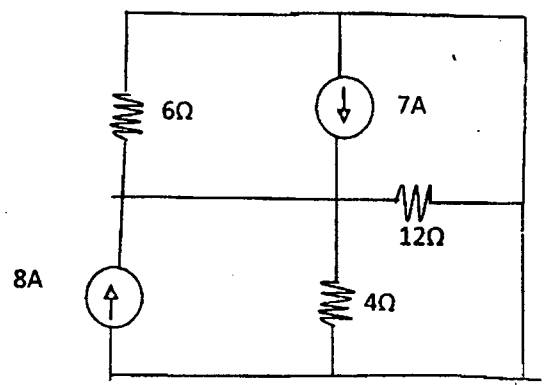


P.T.O.

(*b*) Given $V_1 = 25.0 \angle 143.13°$ and $V_2 = 11.2 \angle 26.57°$, find the ratio V_1/V_2 and the sum $V_1 + V_2$. 4

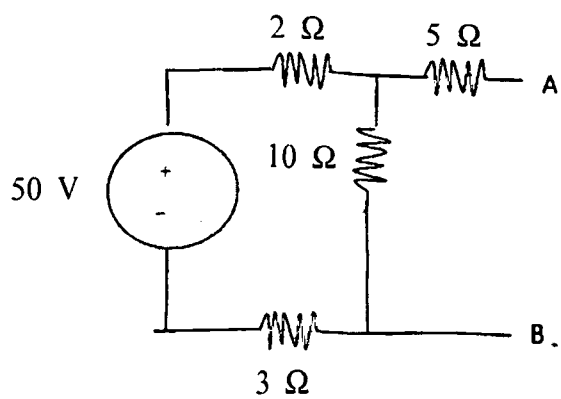
(*c*) State and prove Millman's theorem. 5

3. (*a*) For the network below solve for all currents using nodal analysis. What is the power absorbed by 8A element ? 8

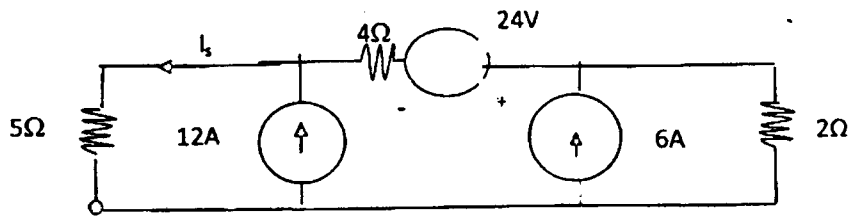


(*b*) State and explain Thevenin and Norton Theorems. 7

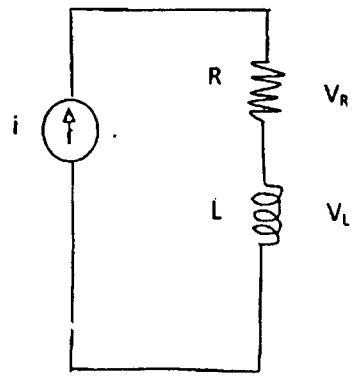
4. (*a*) Find the value of R between AB so that maximum power is transferred by the source. What is the maximum power through the load ? 6



(*b*) Using the superposition theorem find I_s in the circuit shown in figure below : 9



5. (*a*) The RL series circuit shown in fig. has current $i = I \sin \omega t$. Obtain the voltage v across the two circuit elements and sketch v and i also. 8



(*b*) A series circuit with R = 5 Ω and C = 20 μF has a current $i = 2 \cos 5000t$ Amperes flowing through the circuit. Find total applied voltage V_T and the phase angle by which current leads the voltage. 7

6. (*a*) Explain in detail the parallel RLC circuit. Explain the overdamped and underdamped cases also. 10

(*b*) A parallel LCR circuit with R = 1000 Ω, C = 0.16 μF and L = 1H has initial voltage V_0 = 50 V on the capaciter. Obtain the voltage $v(t)$ when the switch is closed at $t = 0$. 5

P.T.O.

7. (*a*) In a series LCR circuit consisting of R = 20 Ω, L = 50 mH and C = 1 μF. Calculate the : 6

(*i*) Resonant frequency (ω_0)

(*ii*) Bandwidth (β)

(*iii*) Quality factor (Q_0) of the resonant circuit.

(*b*) Derive the quality factor for the series RLC circuit. 4

(*c*) Find the power delivered from a sinusoidal voltage source with V_{eff} = 110 V to an impedance of Z = 10 + *j*8. Find the power factor. 5