[This question paper contains 6 printed pages.]

5993 *Your Roll No.* .....

B.Sc. (H) ELECTRONICS / Ist Sem. B

Paper – ELHT-103

Networks Analysis

(Admissions of 2010 and onwards)

Time : 3 Hours *Maximum Marks : 75*

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

Attempt **Five** *questions in all including Q. No.* **1** *which is compulsory. Scientific calculator is allowed.*

1. (i) Sketch the dual of the network given in Fig. 1.

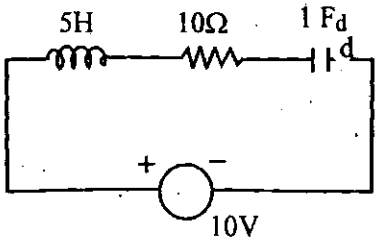

Fig. 1

(ii) Solve the current through 3Ω resistor using Millman's theorem for Fig. 2.

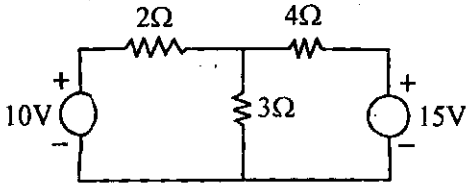

Fig. 2

P.T.O.

(iii) A 5 μF capacitor with an initial voltage of 4V is connected to a parallel combination of 3 KΩ & a 6 KΩ resistor (Fig. 3). Find the transient current in the 6 KΩ resistor

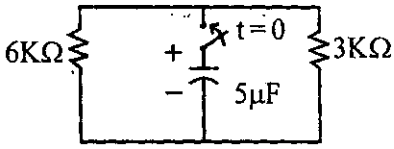

Fig. 3

(iv) Design a passive band pass filter for the frequencies from 1 KHz – 20 KHz using low pass filter and high pass filter.

(v) Write expression for the impedence of a parallel RLC network. What is the impedance at resonant frequency? (5×3)

2. (a) Determine I_b in the circuit of Fig. 4

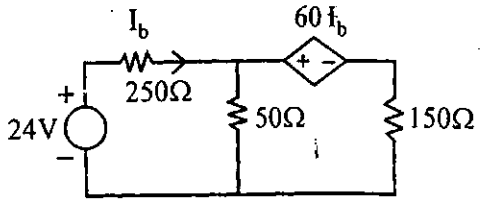

Fig. 4

(b) Find the current through 1Ω resistor using Thevenin's theorem. (Fig. 5)

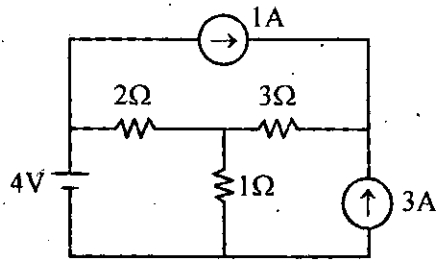

Fig. 5 (5+10)

3. (a) For the circuit of Fig. 6. Find i_0 for $t > 0$.

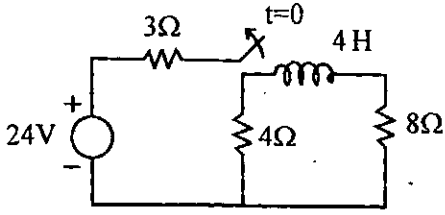

Fig. 6

(b) Assuming that the switch in Fig. 7 has been in position A for a long time and is moved to position B at $t = 0$. Find $v_0(t)$ for $t > 0$.

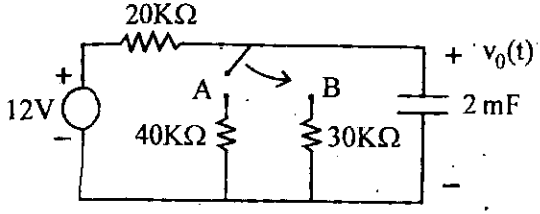

Fig. 7 (7+8)

P.T.O.

4. (a) Find expressions for RMS and average values for a full wave rectified waveform (sinusoidal).

(b) For a voltage source feeding a load of 15Ω & $-10j\Omega$ through a transmission line of $(4+2j)\Omega$ impedence, find the real power, reactive power and apparent power. (Fig. 8)

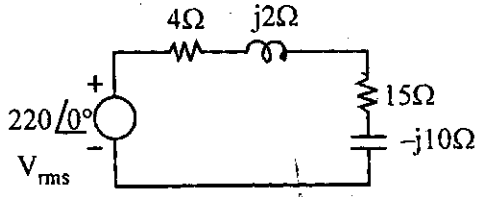

Fig. 8

(c) Obtain the elements of the series circuit corresponding to the voltage-current-phasor diagram (Fig. 9), if the frequency is 21.2 KHz.

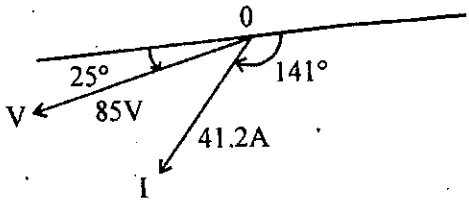

Fig. 9 (8+3+4)

5. (a) Obtain the Norton equivalent of the network of Fig. 10 at terminals xy

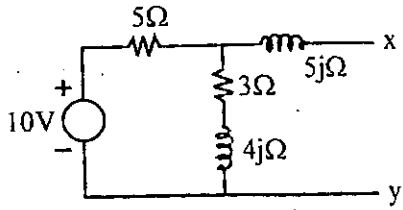

Fig. 10

(b) Find the current through the 1Ω resistor using Thevenin Theorem (Fig. 11)

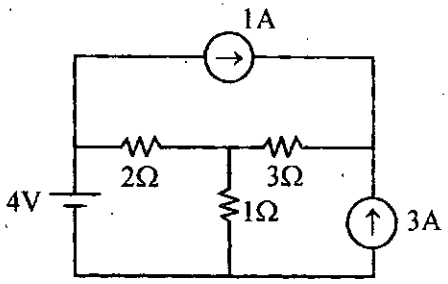

Fig. 11

(c) Obtain the voltage v_L across the inductor in Fig. 12.

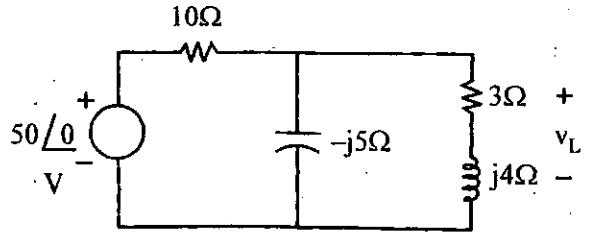

Fig. 12 (5×3)

6. (a) For a series RLC circuit with R = 100Ω, L = 0.5H & C = 0.4 μF, find the resonant frequency. Also obtain the half power frequencies & bandwidth.

(b) A low pass RC filter has R = 5KΩ. What value of C results in a gain of 0.90 at 8 KHz ? Obtain the voltage gain at 12 KHz. (10+5)

P.T.O.

7. (a) Find the Y-parameters of the two-port network of Fig. 13.

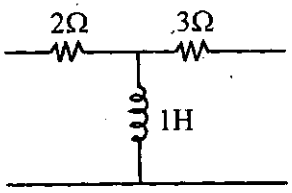

Fig. 13

(b) Given the Y-parameters of a network

$$Y = \begin{pmatrix} \frac{1}{6} & \frac{1}{6} \\ -\frac{1}{12} & \frac{5}{12} \end{pmatrix}.$$

Find its Z parameters and draw its equivalent Z model.

(c) Find the h-parameters of the given network (Fig. 14).

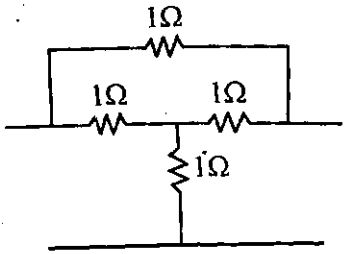

Fig. 14 (5×3)