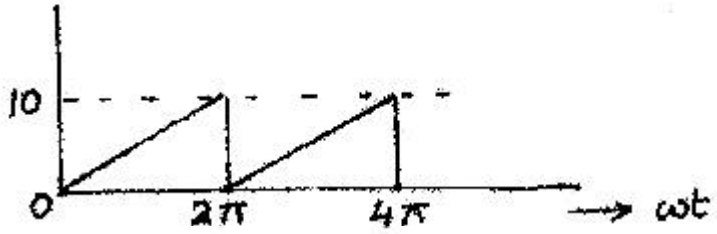
8. a) Find the fourier series for the waveform given below : 10



b) Find out 10

$$\mathcal{L}^{-1}\left(\frac{s+5}{s^2+2s+5}\right)$$

BACHELOR OF COMPUTER SC. ENGG. EXAMINATION, 2011

(1st Year, 1st Semester, Old)

CIRCUIT & NETWORK THEORY

Time : Three hours Full Marks : 100

Answer *any five* questions

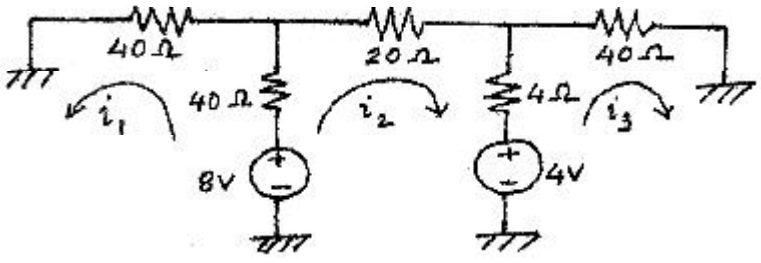
1. a) A series RL circuit is connected to a battery of constant e.m.f. E. Derive the expression for current *i* in the circuit as a function of time. Also derive the expression for voltage across R and L. 10

   b) A voltage v = 250 cos (377t) is applied to a circuit of R and L in series. R = 7·00 ohms and L = 63·7 mH. Find V, Z, I and *i*. Derive the required Expressions. 10

2. a) State and prove the Maximum Power Transfer theorem for circuits with resistances and reactances. 10

   b) Determine by delta-star conversion the total resistance of the following bridge circuit. 10

3. Given the following circuit.



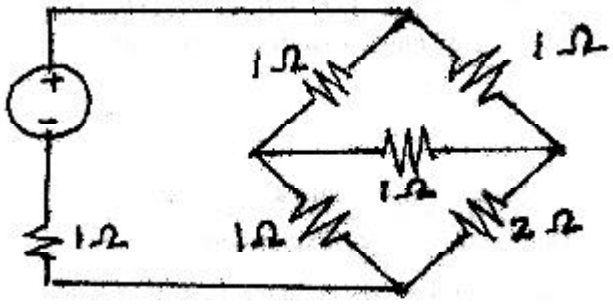
Calculate i_1 and i_3 by

i) Mesh current method.

ii) Node voltage method.

4. a) Write the general equations for conversion from star to delta circuit and vice-versa. 10

b) Given the following circuit.



If a battery of e.m.f. V is at A, what will be the current recorded by an ammeter at B ? What will happen if the position of the battery and the ammeter are interchanged ?

Hence state the Reciprocity theorem. 10

5. a) Draw the series RLC circuit and derive the expression for the following :

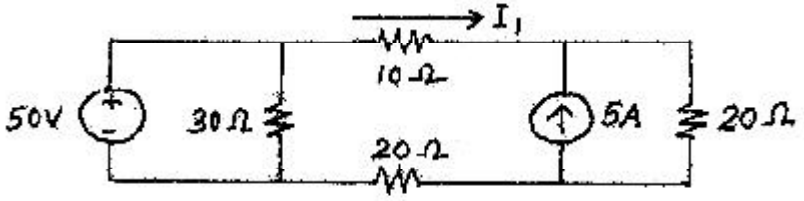
i) Resonant frequency

ii) Bandwidth

iii) Values of impedance and reactance at resonance. 10

b) It is require that a series circuit of L, C, and R be resonant at 1 MHz. Its bandwidth is to be 5000 Hz. and impedance at resonance is to be 50 ohms. Find L, C, and R. 10

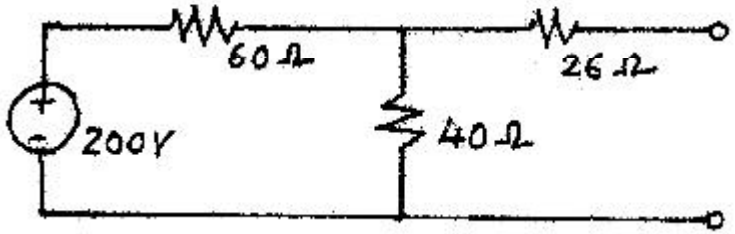
6. a) Obtain the current I_1 in the 10 ohms resistor in the following circuit, using Superposition theorem. 10



b) Replace the following circuit by its

i) Thevenin's equivalent.

ii) Norton's equivalent. 10



7. a) Design one T-section low pass filter of constant - k type. Given that f_c = 2·5 KHz and R_k = R = 10K ohms. 10

b) Design one T-section high pass filter of constant - k type. Given that f_c = 2·5 KHz and R_k = R = 10K ohms. 10