Roll No. ..... Total Pages : 5

008303

January, 2023

B.Tech. (ECE) IIIrd SEMESTER

Network Theory (EC-304)

Time : 3 Hours] [Max. Marks : 75

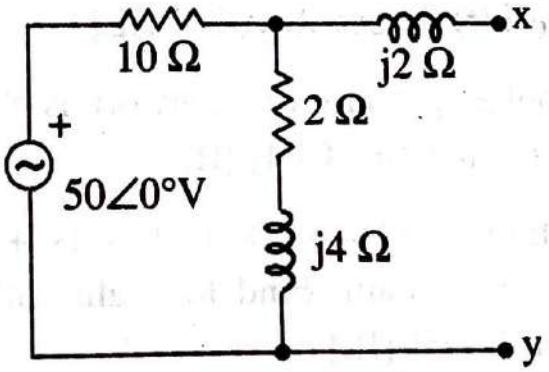
Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

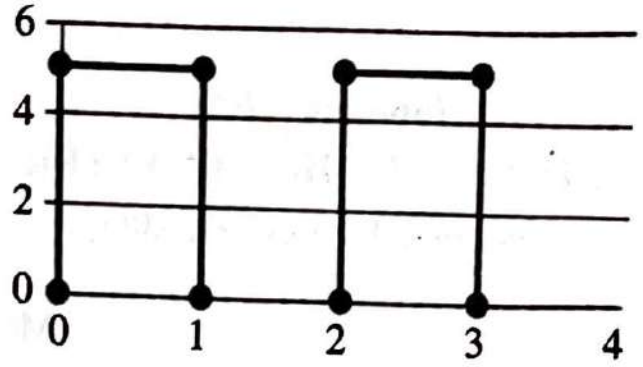
PART–A

1. (a) An RC series circuit is excited by step voltage of magnitude 10 VDC. With R = 1 ohms and C = 1 microfarad, find the value of di/dt at t = 0+. [C01] [IL] (1.5)

(b) For the circuit shown below find out the Norton current. [C01] [IL] (1.5)

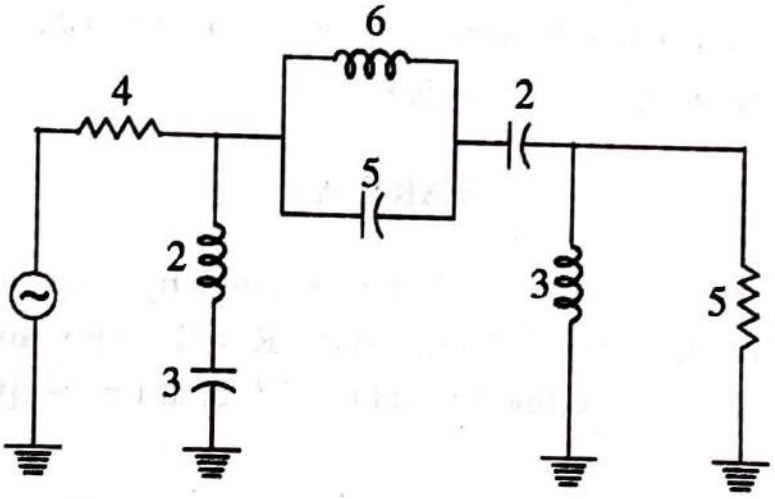


(c) Find Laplace transform of following periodic waveform [C03] [IL] (1.5)



(d) Explain, what is the effect of symmetry for a periodic function to determine the periodic trignometric Fourier Series. [C05] [IL] (1.5)

(e) Draw dual of the following circuit: [C0l] [IL] (1.5)



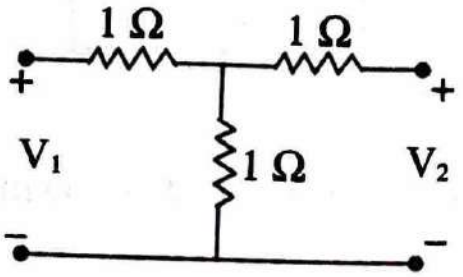
(f) In an RL parallel circuit excited by current source i(t) = 5 Amp. R = 1 ohm and L = 1 Henry. Find the value of voltage v(t) across R. [C01] [IL] (1.5)

(g) The impulse response of a network is $e^{-t} + e^{-2t}$. Find the transfer function. [C04] [IL] (1.5)

(h) A voltage V(s) = (s + 1) / (s (s + 2)) is given in frequency domain. Find the value of voltage in time domain. [C03] [IL] (1.5)

(i) Find the value of attenuation for α low pass filter having L = 10 mH and C = 1 μF at frequency, f = 1000 Hz. [C05] [IL] (1.5)

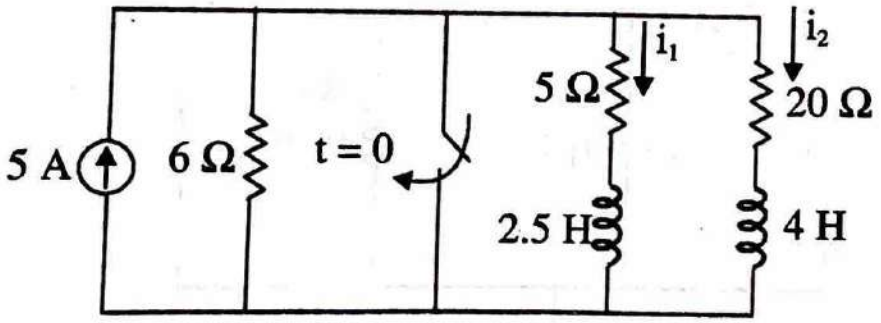
(j) Calculate the value of parameters A, B only (part of T parameters) for the following circuit: [C04] [IL] (1.5)



PART–B

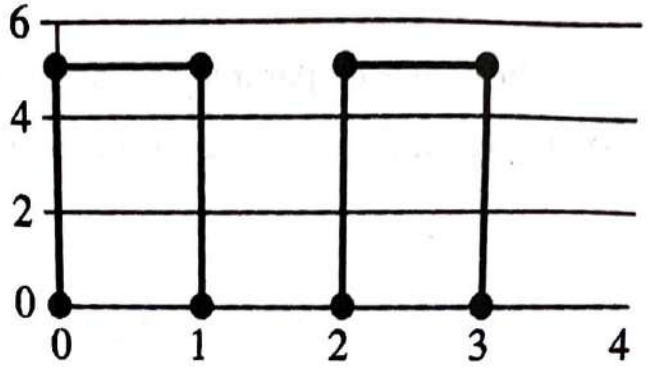
2. (a) State and prove maximum power transfer theorem for AC circuit [C02] [IL] (7.5)

(b) In the figure below the switch S is open for infinite time and then closed at time t = 0. Find the current $i_1(t)$ and $i_2(t)$. [C01] [IL] (7.5)

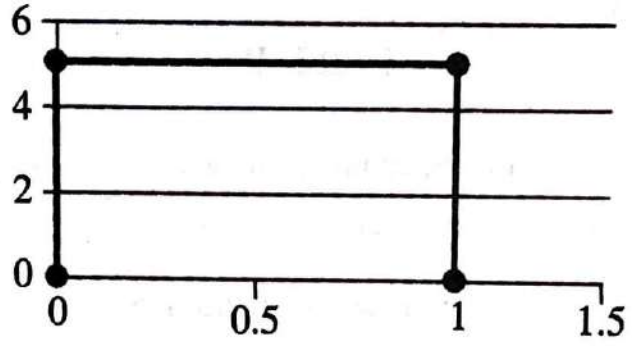


3. (a) For a signal x(t) = 1 for $-1 < t < 1$ and y(t) = 1 for $-2 < t < 2$. Find and plot the convolution of signals x(t) * y(t). [C05] [IL] (7.5)

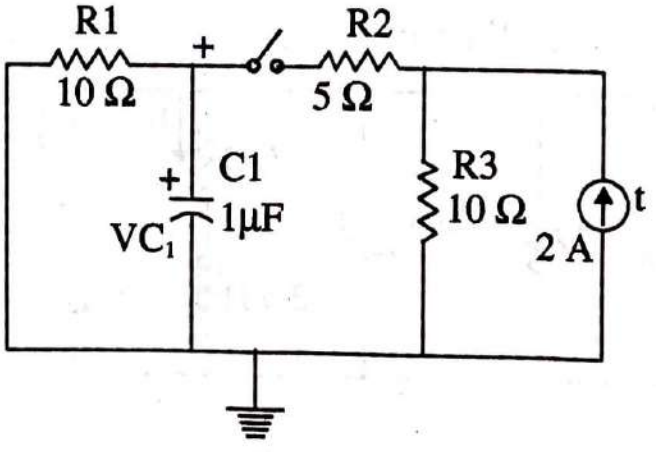
(b) Find the exponential Fourier series of following period waveform. [C05] [IL] (7.5)



4. (a) Find Fourier transform of following waveform. [C05] [IL] (7.5)

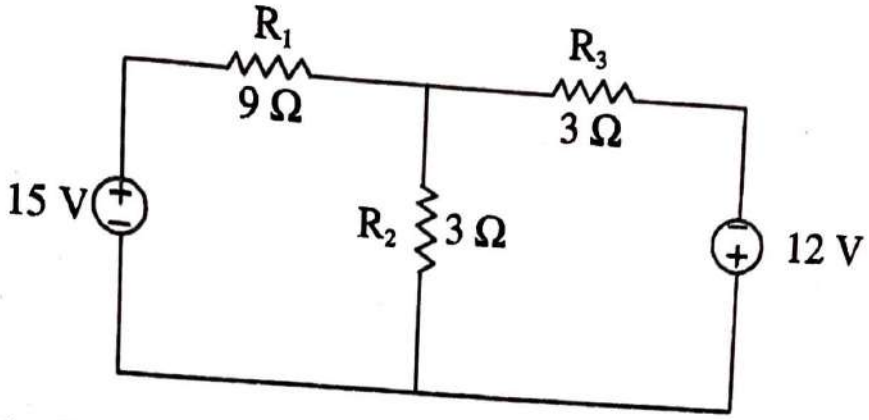


(b)



Switch S is closed for infinite time and then opened at t = 0. Find the value of capacitor voltage Vc_1 (t). [C01] [IL] (7.5)

5. (a) Prove Tellegen's theorem for the network given below: [C02] [IL] (7.5)



(b) Express Y parameters in terms of G parameters. [C04] [IL] (7.5)

6. (a) For a two port network prove condition for symmetry using Z parameters [C04] [IL] (7.5)

(b) Output voltage of a network is given by $V(s) = 4s / (s + 2)(s^2 + 2s + 2)$. Plot its pole zero diagram and find out v(t). [C03] [IL] (7.5)

7. (a) Design and draw a T type band pass filter having cut off frequencies f 1 = 1000 Hz and f 2 = 1200 Hz. Take R0 = 600 ohm. [C05] [IL] (7.5)

(b) Derive the expression for characteristics impedance Z0 in terms of Zl & Z2 for T type constant k filter. [C05] [IL] (7.5)