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008303

December 2024

B. Tech. (ECE) (Third Semester)

Network Theory (EC-304)

Time : 3 Hours] *[Maximum Marks : 75*

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

Part A

1. (a) Synthesize the following wave in terms of standard signals. **1.5**

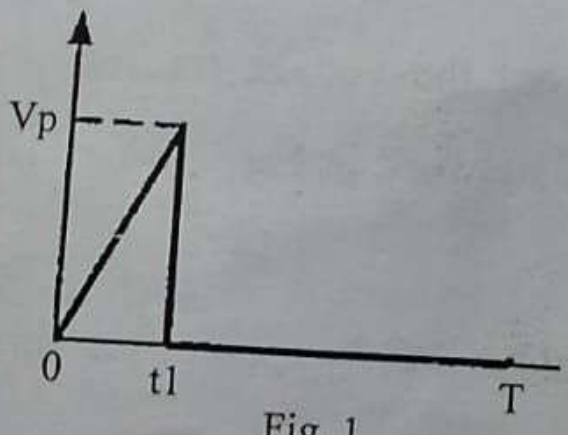


Fig. 1

(b) In a series combination of R and L, the inductor is having initial current of 1 A. Derive and expression for current through inductor for time $t > 0$. 1.5

(c) Find the Laplace transform of $M * (t-a) * u(t)$. 1.5

(d) Find out the transfer admittance $Y_{21}(s)$ of the following network where $R_1=R_2=R_3= 1$ ohm. 1.5

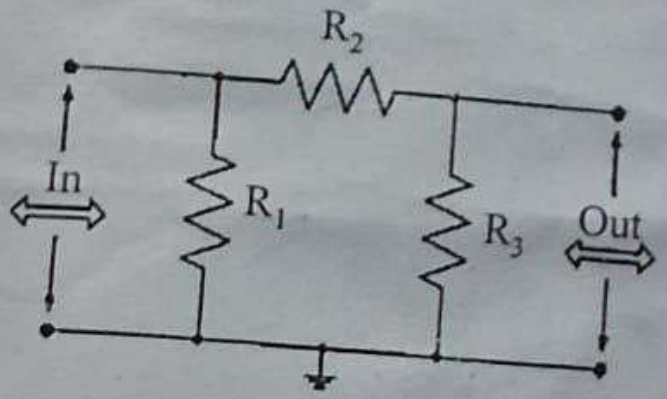


Fig. 2

(e) Find out the voltage transfer ration $V_{21}(s)$ of the network in Fig. 2 where $R_1=R_2=R_3=1$ ohm. 1.5

(f) Calculate the Z_{11} parameter for network in Fig. 2. 1.5

(g) State with reasons whether the following function suitable as current transfer function or not ? 1.5

$$F(s) = \frac{s^2 + 1}{s^2(s+2)}$$

(h) Calculate the value of characteristics impedance, Z of T section of high pass filter having R_0 = 500 Ohm, f = 1000 Hz, f_c = 800Hz. 1.5

(i) Calculate Fourier Transform F(w) for waveform in Fig. 3. 1.5

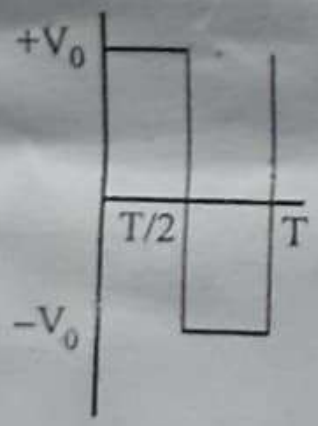
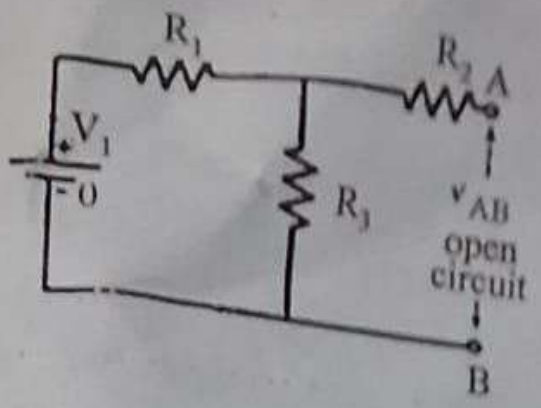


Fig. 3

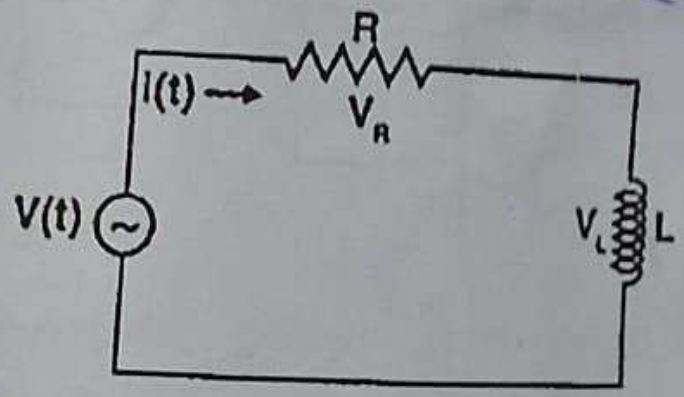
(j) Find the Norton current for the following circuit between point AB with R_1=R_2=R_3=1 ohm and V_1 = 10 V. 1.5



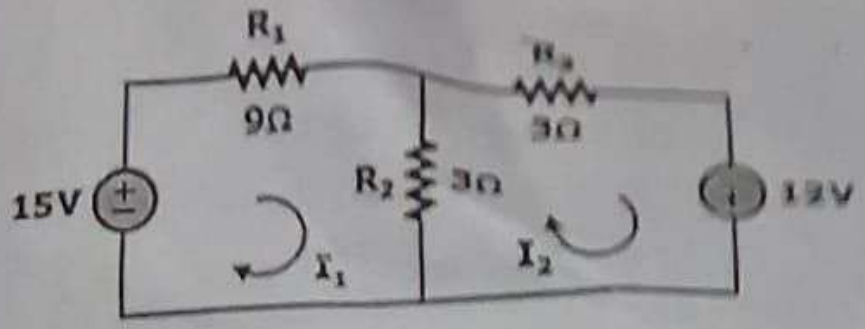
Part B

2. (a) Find Laplace transform of exp(-at) * cosh (bt) * u(t). 7.5

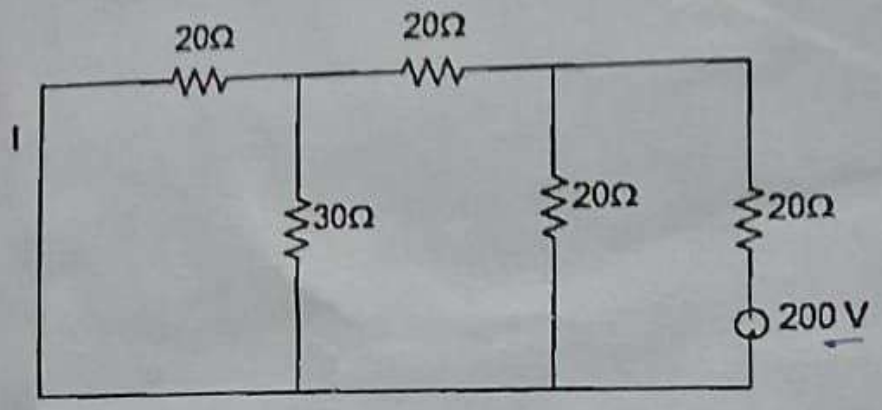
(b) Obtain the value of current $i(t)$ in the circuit *given* below to $v(t)=20\sin(1000t + 45)$ for $R = 1$ ohm, L = 1 mH. 7.5



3. (a) Verify the Tellegen Theorem for the following network : 7.5

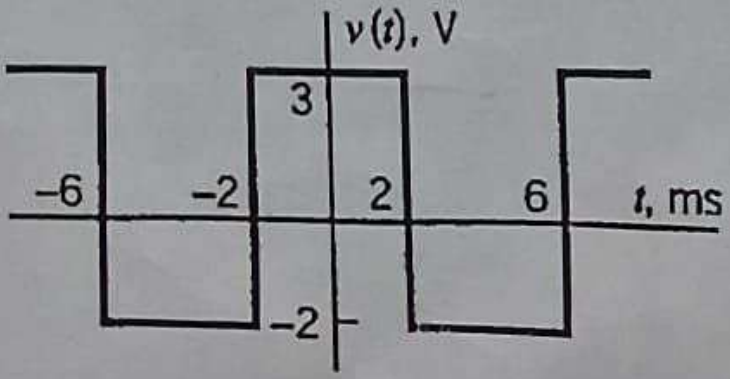


(b) Solve for currents in all the branches using nodal analysis. 7.5



4. (a) Calculate Fourier transform of waveform in Fig. 3. 7.5

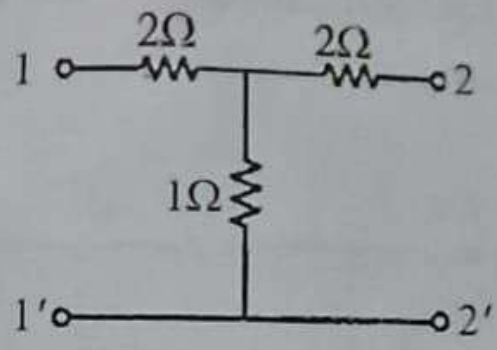
(b) Find Fourier series of the following waveforms. 7.5



5. (a) Express Z parameter in terms of Y parameters. 7.5

(b) State necessary condition for driving point function. 7.5

6. (a) Find the voltage transfer function $V_2(s)/V_1(s)$ with output open circuited. 7.5



(b) Design low pass filter with $R_0 = 600$ ohm, $f_c = 600$ Hz. 7.5

7. (a) Design a high pass filter with $R_0 = 600$ ohm, $f_c = 600$ Hz. 7.5

(b) Find convolution of two pulses. 7.5