Total No. of Questions : 5] [Total No. of Printed Pages : 4

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305(N)

B. E. (Third Semester) EXAMINATION, Dec., 2010

(New Scheme)

(Common for EC, EE, EI, EX & BM Engg. Branch)

NETWORK ANALYSIS

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. All questions carry equal marks.

1. (a) Discuss the properties of an ideal current source and an ideal voltage source. Explain how a voltage source can be converted into an equivalent current source and vice versa. 8

   (b) A 5μF capacitor is connected in series with a coil having an inductance of 50 mH. Determine the frequency of resonance, the resistance of coil, if a 50 V source operating at resonance frequency causes a circuit current of 10 mA. What is the Q factor of the coil ? 12

Or

   (a) Explain the terms 'tie-set matrix' and 'cut-set matrix' of a network with illustrative examples. 8

   (b) In the network shown in fig. 1 ahead, switch 'K' is closed at $t = 0$, connecting a source e^{-t} to the R-C network. At $t = 0$, it is observed that the capacitor voltage has the value $v_c(0) = 0{\cdot}5$ volt. For the element values given, determine $v_2(t)$. 12

P. T. O.

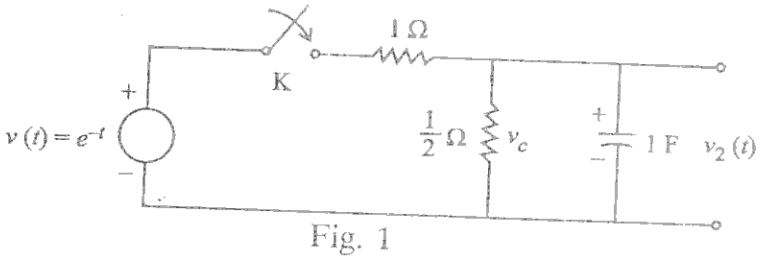

Fig. 1

2. (a) State and explain 'Maximum power transfer theorem' for an A. C. circuit. 6

(b) For the network shown in fig. 2, replace the circuit to the left of terminals AB with a Thevenin's equivalent. Then determine the current in the $2 - j2\ \Omega$ impedance connected to the equivalent circuit. 14

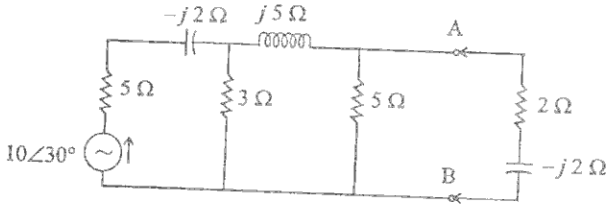

Fig. 2

Or

(a) State and explain 'Millman's theorem'. 5

(b) For the network shown in fig. 3, using Millman's theorem, find the current in the load impedance $\bar{Z}_L = (2 + j4)\ \Omega$. 15

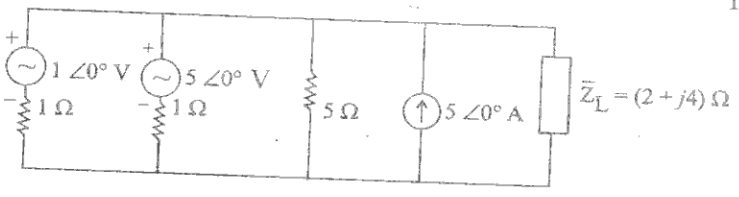

Fig. 3

3. (a) Show that the transform of any function delayed to begin at the time $t = a$ is e^{-as} times the transform of the function when it begins at time $t = 0$. 6

(b) The waveform shown in ahead fig. 4 is known as a staircase. Assuming that the staircase is not repeated,

write an equation for it in terms of unit-step functions. If this voltage is applied to an R-L series network with $R = 1\ \Omega$ and $L = 1\ H$, find the current $i(t)$. 14

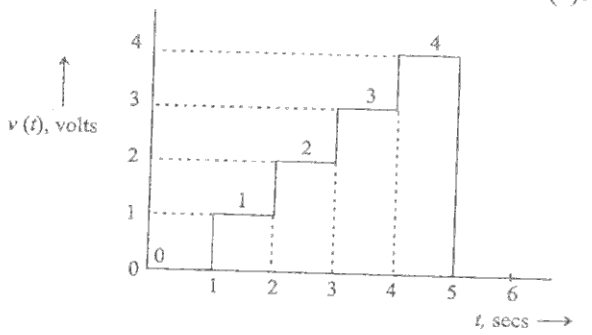

Fig. 4

Or

In the network shown in fig. 5, the switch K is thrown from position 1 to 2 at time $t = 0$. Just before the switch is thrown, the initial conditions are $i_L(0_-) = 4$ amp, $v_C(0_-) = 4$ volts. Find the current $i(t)$ after the switching action, using Laplace transformation method. 20

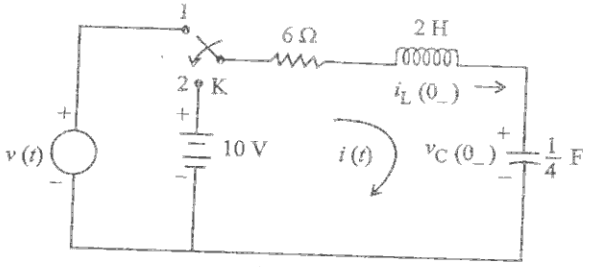

Fig. 5

4. (a) Discuss the effect of symmetry for a periodic function to determine the trigonometric Fourier series representation. 5

(b) Find the trigonometric Fourier series for a half-wave rectified sine wave shown in fig. 6. 15

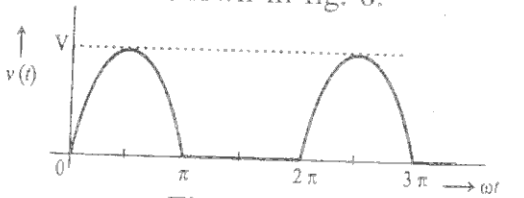

Fig. 6

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Or

(a) Explain the terms, 'even-symmetry' 'odd-symmetry' for periodic waveforms with Fourier series representation. 6

(b) Find the trigonometric Fourier series for the waveform shown in fig. 7 and sketch the spectrum. 14

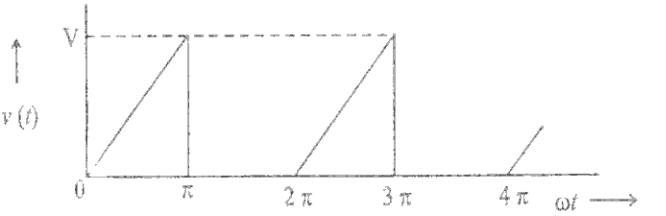

Fig. 7

5. (a) Define the terms, 'Driving point impedance' and 'Voltage ratio transfer function' with reference to two-port networks. 6

(b) The network shown in fig. 8 contains resistors and controlled sources. For this network determine $G_{12}(s) = \frac{V_2(s)}{V_1(s)}$. 14

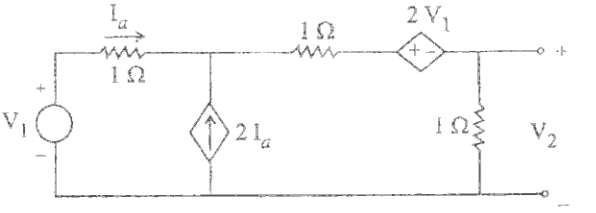

Fig. 8

Or

The network shown in fig. 9 is a bridged T. RC network. For the values given, find 'Y' and 'Z' parameters. 20

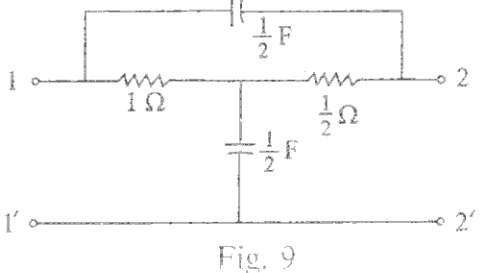

Fig. 9