Total No. of Questions : 5] [Total No. of Printed Pages : 6

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305(N)

B. E. (Third Semester) EXAMINATION, June, 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. Questions have internal choice. All questions carry equal marks.

1. (a) What are the properties of an ideal current source and ideal voltage source ? 4

   (b) Explain the 'principle of duality'. 4

   (c) Explain the terms 'tie-set matrix' and 'cut-set matrix' of a network with illustrative example. 12

Or

   (a) Discuss the properties of series-resonant circuit. 4

   (b) Calculate the value of mutual inductance in the series connection of two mutually coupled coils, if the effective inductance is 70 mH when they assist each other and is 30 mH when they oppose each other. 4

(c) In the network shown in fig. 1, the switch K is opened at $t = 0$. For the element values given, determine the value of v, $\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0_+$. 12

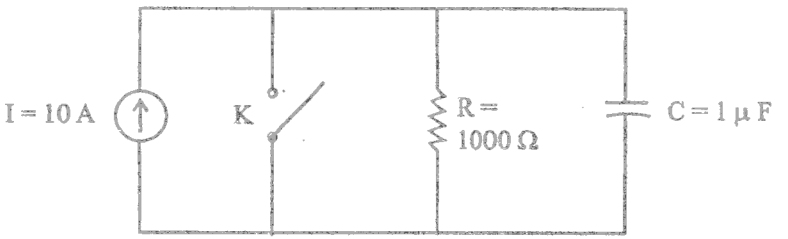

Fig. 1

2. (a) State and explain 'Thevenin's theorem'. 6

(b) Use the Thevenin's theorem to find the power in a 1-Ohm resistor connected to the terminals AB of the network shown in fig. 2. 14

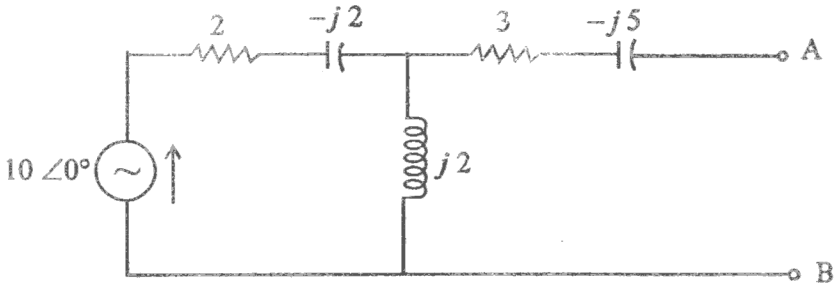

Fig. 2

Or

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

(b) In the network shown in fig. 3 ahead, determine the value of impedance Z_L for maximum power and calculate the maximum power. 14

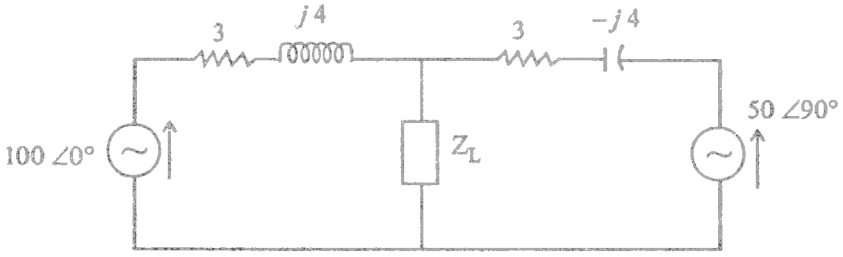

Fig. 3

3. (a) The wave form shown in fig. 4, is non-recurring. Write an expression for $v(t)$. Find the transform $V(s)$ for $v(t)$. 8

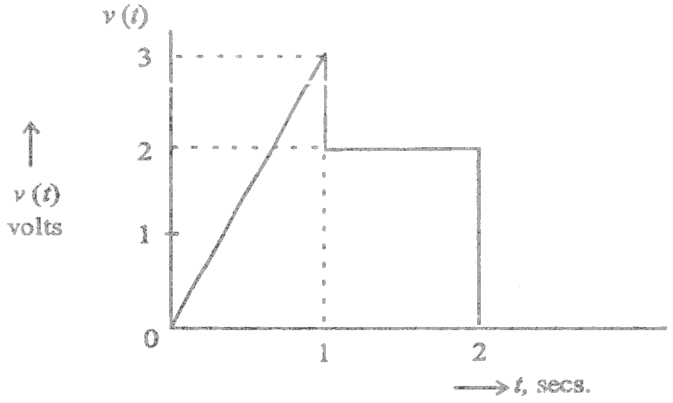

Fig. 4

(b) A step voltage $3u(t-3)$ is applied to a series RLC network, comprising $R = 5\ \Omega$, $L = 1$ H and $C = \frac{1}{4}$ F as shown in fig. 5. Find the expression for the current $i(t)$. 12

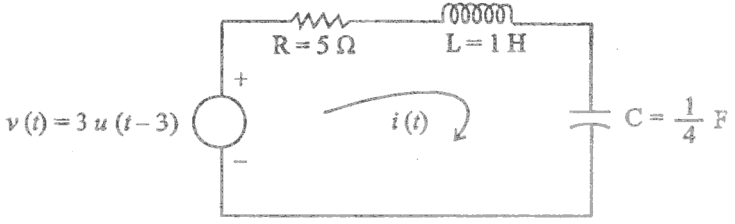

Fig. 5

Or

(a) Obtain the S-domain equivalent circuit for a capacitor with initial voltage. 6

(b) A voltage pulse of magnitude 4 volts and duration 2 secs, extending from $t = 2$ secs to $t = 4$ secs, is applied to a series R-L network as shown in fig. 6. Find the expression for the current $i(t)$. 14

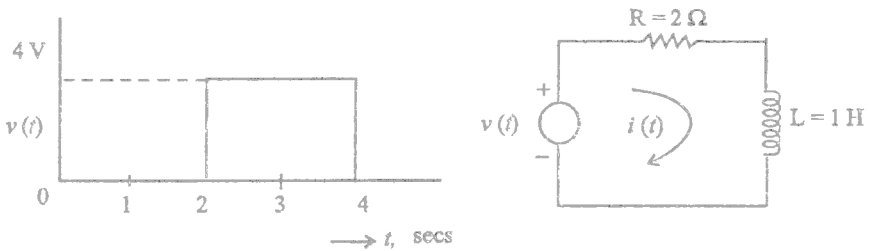

Fig. 6

4. (a) What is half-wave symmetry ? Explain with the help of an example. 5

(b) Find the trigonometric Fourier series for the half-wave rectified sine wave shown in fig. 7 and plot the amplitude and phase spectra. 15

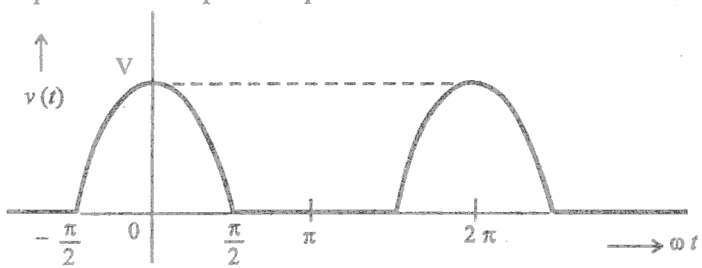

Fig. 7

Or

(a) Explain the terms even-symmetry and odd-symmetry for periodic wave forms with Fourier series representation. 6

(b) Find the trigonometric Fourier series for the sawtooth wave shown in fig. 8 and plot the spectrum. 14

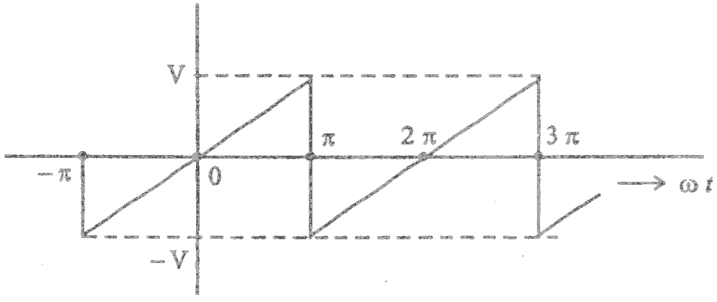

Fig. 8

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

(b) For the network shown in fig. 9, determine : 14

(i) Voltage-ratio transfer function, $\frac{V_2(s)}{I_1(s)}$.

(ii) Transfer impedance, $Z_{12}(s) = \frac{V_2(s)}{I_1(s)}$.

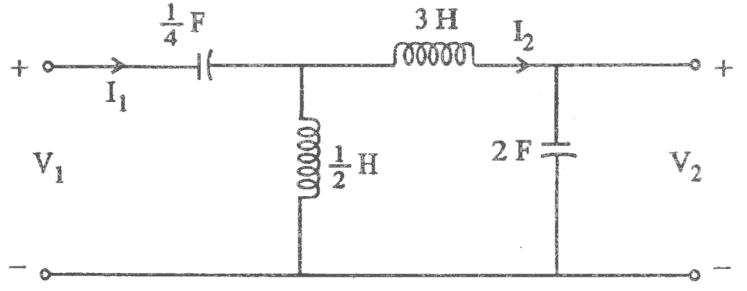

Fig. 9

Or

(a) Define 'Open circuit impedance' parameters of two-port networks. How can the 'transmission' parameters be obtained from the 'open circuit impedance' parameters ? 8

(b) Find the transmission parameters for the network shown in fig. 10. 12

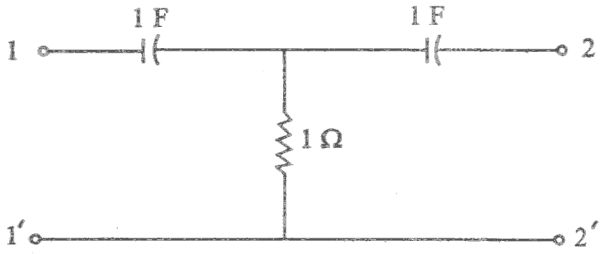

Fig. 10