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

Roll No. ....

305(N)

B. E. (Third Semester) EXAMINATION, Feb., 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 *one* question from each Unit. Total *five* questions are to be attempted. All questions carry equal marks.

Unit – I

1. (a) Explain clearly with the help of examples the following terms used in network analysis :   10

   (i)   Network graph

   (ii)   Tree of a graph

   (iii) Cut-set and Tie-set matrix

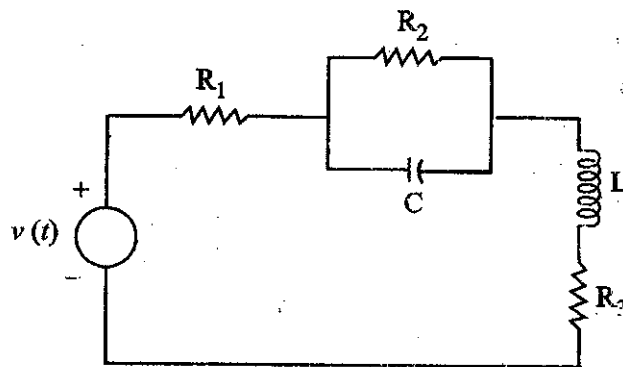   (b) Draw the dual for the network shown in fig. 1.   10

Fig. 1

P. T. O.

Or

(a) Discuss the initial conditions of the elements inductor and capacitor. Outline the procedure for evaluating initial conditions in network problems.   8

(b) In the network shown in fig. 2, the switch K is closed and a steady state is reached in the network. At $t = 0$, the switch is opened. Find an expression for the current in the inductor, $i_2(t)$.   12
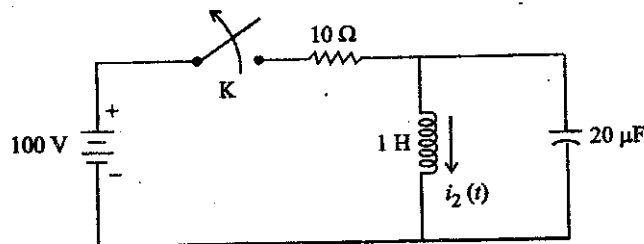

Fig. 2

Unit – II

2. (a) State and explain 'superposition theorem' and also write its limitations.   5

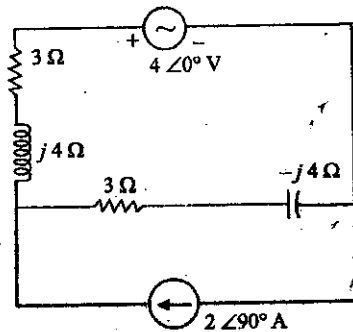(b) Determine the current in the capacitor branch by the superposition theorem, in the network of fig. 3.   15

Fig. 3

Or

(a) State and explain the following :   6

   (i) Reciprocity theorem   (ii) Millman's theorem

(b) Find the Thevenin's equivalent circuit at terminals AB
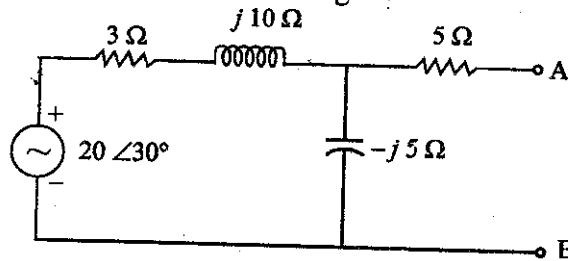for the network shown in fig. 4.   14

Fig. 4

Unit – III

3. (a) The waveform shown in fig. 5 occurs only once. Write
an expression for $v(t)$. Find the transform $v(s)$ for
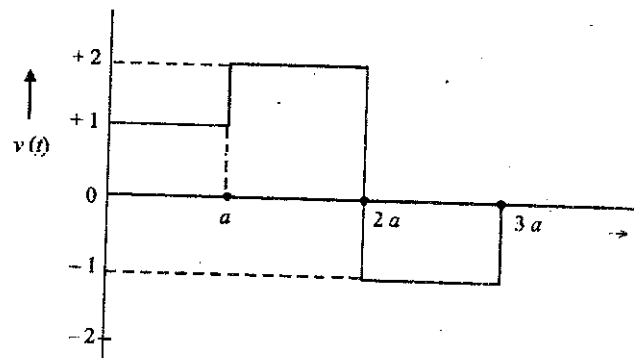$v(t)$.   8

Fig. 5

(b) A unit impulse voltage $\delta(t-2)$ is applied to a series
R-L network, where L = 1 H, R = 3 Ω. If the impulse
is applied at $t = 0$, while the initial condition of the
network is $i(0) = 0$, find $i(t)$.   12

Or

(a) Obtain the S-domain equivalent circuit for an inductor
with initial current.   5

(b) Define 'unit impulse function' and derive its Laplace
transform.   5

(c) If the capacitor is uncharged and the inductor current is zero at $t = 0 -$, in the network shown in fig. 6, show that the transform of the generator current is :   10

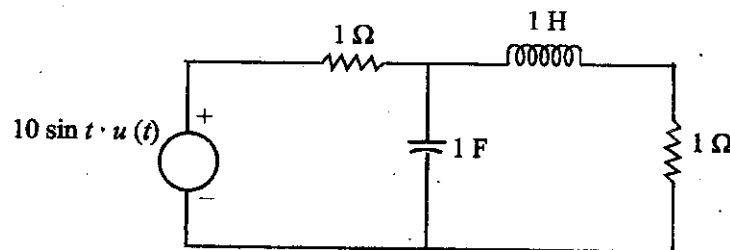$$I(s) = \frac{10\,(s^2 + s + 1)}{(s^2 + 1)\,(s^2 + 2s + 2)}$$

Fig. 6

Unit – IV

4. (a) What are the Dirichlet conditions for the Fourier series representation ?   4

(b) The waveform shown in fig. 7 consists of a train of isosceles triangles. For this waveform, determine the Fourier coefficients and plot the corresponding amplitude and phase spectra.   16
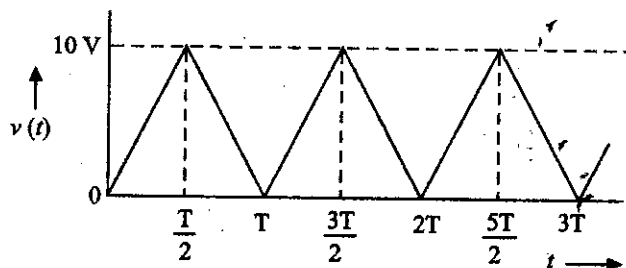

Fig. 7

Or

(a) Explain with the help of an example the 'half-wave symmetry'.   5

(b) Find the trigonometric Fourier series for the square
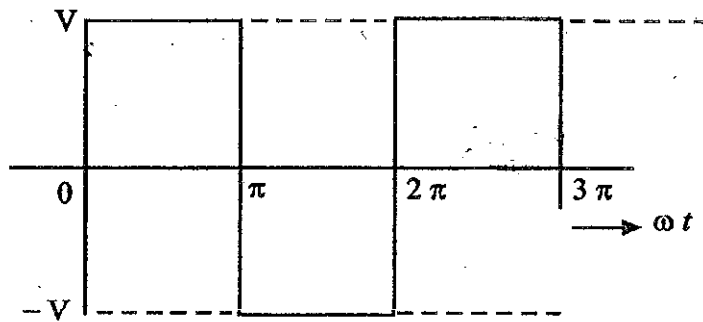   wave shown in fig. 8 and plot the line spectrum.   15

Fig. 8

Unit — V

5. (a) Define the terms 'transfer admittance' and 'voltage
    ratio transfer function' with reference to two-port
    networks.   6

(b) Find the open circuit transfer impedance $\dfrac{V_2(s)}{I_1(s)}$ and

    open circuit voltage ratio $\dfrac{V_2(s)}{V_1(s)}$ for the network

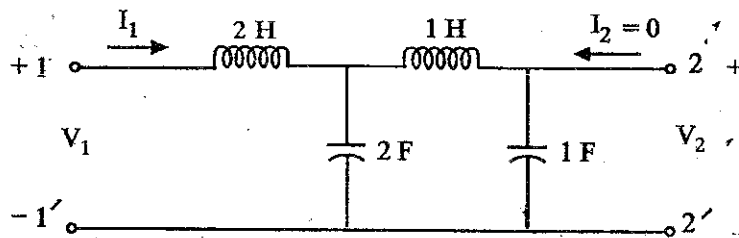   shown in fig. 9.   14

Fig. 9

Or

(a) What are the 'open circuit impedance' parameters of
    two-port networks ? How can the 'transmission

parameters' be obtained from the 'open circuit impedance' parameters ?   10

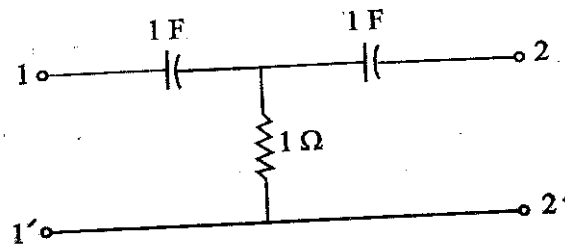(b) *Find the transmission* parameters (A, B, C, D) for the network shown in fig. 10.   10

Fig. 10

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