NEW SCHEME

EE34

USN | | | | | | | | | | |

Third Semester B.E. Degree Examination, January/February 2004

Electrical & Electronics Engineering

Network Analysis

Time: 3 hrs.] [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Distinguish the following with suitable examples.
   i) Linear and non-linear elements
   ii) Unilateral and trilateral elements
   iii) Independent and dependent sources. (6 Marks)

   (b) Write the mesh equation for the circuit shown in Fig 1(b) and determine mesh currents using mesh analysis.

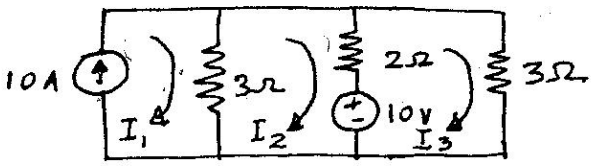

Fig 1(b)

(6 Marks)

   (c) Develop a model equation for a general network in the form [Y] [V] = [I]
   Where [Y] = Admittance matrix
   [V] = Node voltage matrix
   [I] = Source current matrix. (8 Marks)

2 (a) Establish star - delta relationship suitably. (3 Marks)

   (b) Explain incidence matrix of a network graph? Give suitable example. (4 Marks)

   (c) Define the following with suitable examples
   i) Planar and non-planar graph
   ii) Twigs and links. (5 Marks)

   (d) For the network shown in Fig 2(d) write the graph of the network and obtain the tie-set schedule considering J_1, J_2, J_5 as tree branches. Calculate all branch

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currents.

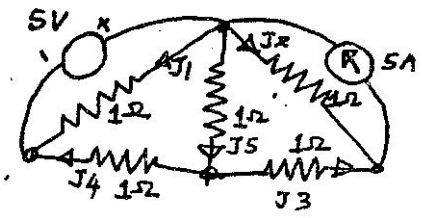

Fig 2(a)

(8 Marks)

3. (a) Find the condition for maximum power transfer in the following network type AC source, complex source impedance and complex load impedance but only load resistance varying.

(7 Marks)

(b) In the circuit shown in fig 3(b) find the load connected at AB for which the power transferred will be maximum. Also find maximum power.

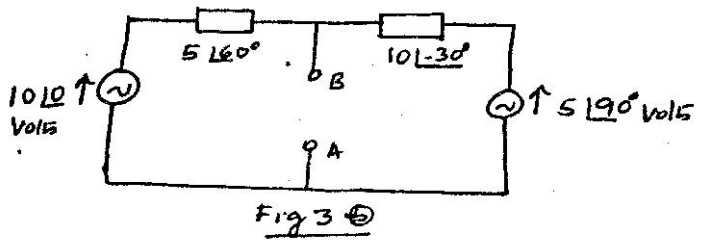

Fig 3(b)

(8 Marks)

(c) In the circuit shown in fig 3(c) Find V_x and prove reciprocity theorem.

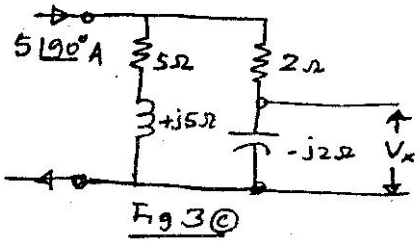

Fig 3(c)

(5 Marks)

4. (a) "Thevenin's equivalent is the dual of Norton's equivalent". Comment on the above statement and substantiate the same.

(4 Marks)

(b) Determine the current through 2Ω resistor of the network shown in Fig. 4(b) using superposition principle.

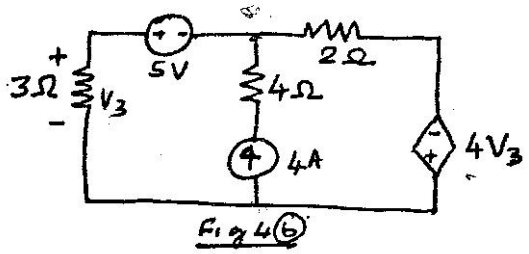

Fig 4(b)

(6 Marks)

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(c) State Millman's theorem, using the same calculate current through the load in the circuit shown in fig. 4(c)

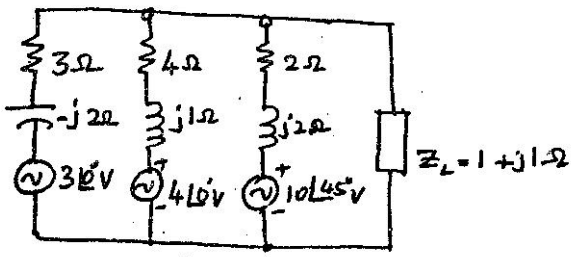

Fig 4©

(8 Marks)

5. (a) Define quality factor and bandwidth. Also establish the relationship between them in a series resonance circuit. (7 Marks)

(b A series resonance circuit with $R = 10\Omega, L = 0.1H$ and $C = 50\mu F$ has an applied voltage $V = 50\angle 0^0$ with a variable frequency. Find the resonant frequency, the value of frequency at which maximum voltage occurs across inductor and the value of frequency at which maximum voltage occurs across capacitor. (6 Marks)

(c) Explain parallel resonance? Derive the condition for parallel resonace when RL connected parallel to RC. (7 Marks)

6. (a) Establish the procedure for evaluating initial conditions with suitable examples. (8 Marks)

(b) In the circuit shown in Fig 6(b) $V = 10V$, $R = 10\Omega$, $L = 1H$, $C = 10\mu f$, and $V_c(0) = 0$. Find

$i(o+)$, $\frac{di}{dt}(0+)$ and $\frac{d^2i}{dt^2}(o+)$ if switch K is closed at t =0

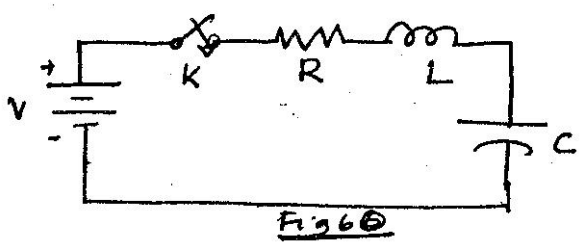

Fig 6©

(6 Marks)

(c) Find i(t) for the following network shown in Fig.6 (c) if the switch 'K' is opened at t=0, before that the circuit has attained steady state condition (6 Marks)

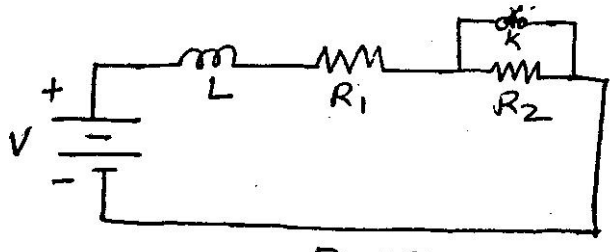

Fig 6©

7. (a) Obtain the Laplace Transform of a periodic function with a suitable example wave form. Also find the Laplace transform of the following wave form shown in Fig 7(a) **(7 Marks)**

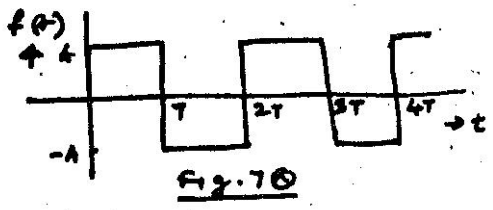

Fig. 7Q

(b) State and prove convolution theorem. Using the same find f(t) when $F(s) = \frac{1}{s^2(s+1)}$. **(8 Marks)**

(c) Using Laplace transform determine the current in the circuit shown in Fig 7(c) when the switch S is closed at t=0. Assume zero initial condition.

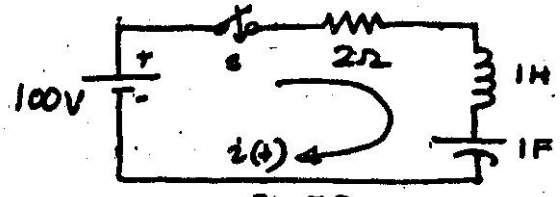

Fig. 7Q

(5 Marks)

8. (a) Explain Z and Y parameters with equivalent circuit.
Also express Z - parameters in terms of Y - parameters. **(10 Marks)**

(b) Find the h-parameters of the network shown in Fig 8(b) Give its equivalent circuit.

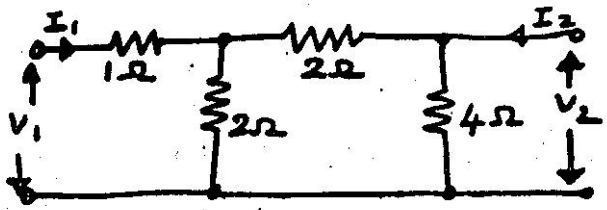

Fig. 8Q

(10 Marks)

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