B.Tech. Degree III Semester Examination November 2013

EE 1304 CIRCUITS SIGNALS AND SYSTEMS I
(2012 Scheme)

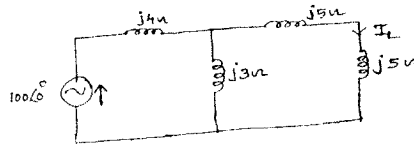Time : 3 Hours   Maximum Marks : 100

PART A
(Answer ALL questions)

(8 × 5 = 40)

I.   (a)   Explain maximum power transfer theorem for ac circuits.

(b)   For the circuit shown in figure, determine the load current by applying Thevenin's theorem.


(c)   Define the following terms:
(i) Tie set matrix (ii) Incidence matrix

(d)   Define coefficient of coupling. Derive an expression for it in terms of self and mutual inductances of the coupled coils.

(e)   Explain the 2-wattmeter method of 3ϕ power measurement.

(f)   Explain unbalanced 4 wire star connected load.

(g)   Write short notes on amplitude and phase spectrum.

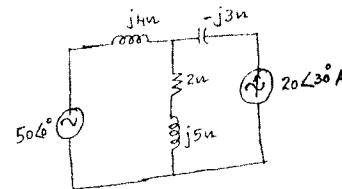(h)   Explain the properties of Fourier transforms.

PART B

(4 × 15 = 60)

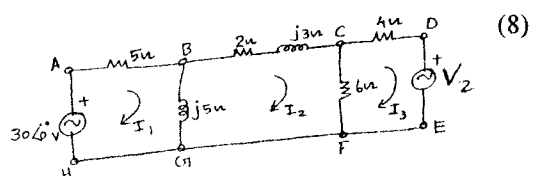II.   (a)   State and explain reciprocity theorem. In figures (a) and (b) obtain V_o and establish the reciprocity theorem.   (8)
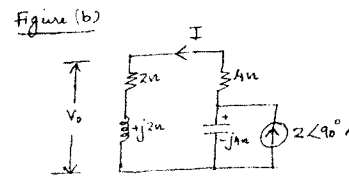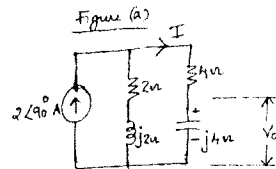
(b)   Determine the voltage across $(2 + j5)\Omega$ impedance as shown in figure by using the super position theorem.   (7)
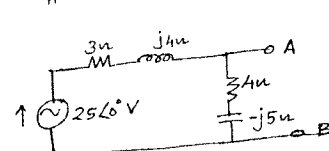

OR

III.   (a)   What is the value of V_2 such that the current in $(2 + j3)\Omega$ impedance is zero?   (8)
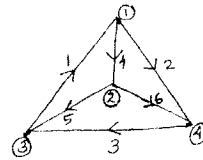

(b)   For the circuit shown in figure, determine Norton's equivalent circuit between the O/P terminals AB.   (7)
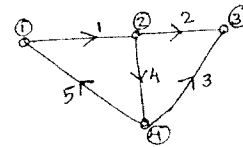

(P.T.O.)

IV.   For the graph shown in figure, obtain the tie set matrix and network equilibrium equation in matrix form using KVL by selecting branches 4,5,6 as twigs. Also calculate loop currents and branch currents.   (15)
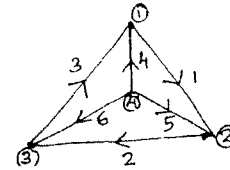
OR

V. (a) Develop the fundamental cut set matrix of the graph given below by taking branches 1,2 and 5 as twigs.   (5)

  (b) Obtain the tie set matrix of the graph given below by selecting branches 4,5 and 6 as twigs.   (5)
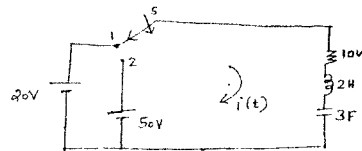
  (c) Explain an ideal transformer   (5)

VI. (a) Explain the transient response of an RL circuit having DC excitation.   (8)

  (b) In the network shown in figure, the switch is moved from position 1 to position 2 at t=0. The switch is in position 1 for a long time. Determine the current expression i(t).   (7)
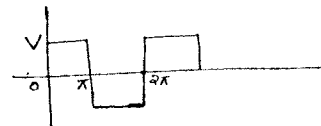
OR

VII. (a) Explain the transient response of an RC series circuit with sinusoidal excitation.   (8)

  (b) An unbalanced 4 wire, star connected load has a balanced voltage of 400V, the loads are $Z_1 = (4 + j8)\Omega$, $Z_2 = (3 + j4)\Omega$, $z_3 = (15 + j20)\Omega$ (7)

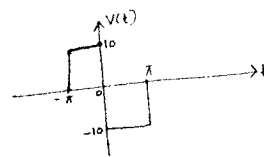   Calculate (i) line currents (ii) current in the neutral wire and (iii) total power

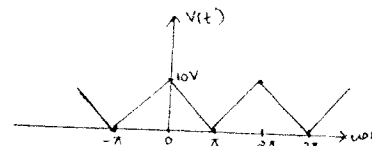VIII. (a) A square wave is shown in figure. Obtain the trigonometric Fourier series   (8)

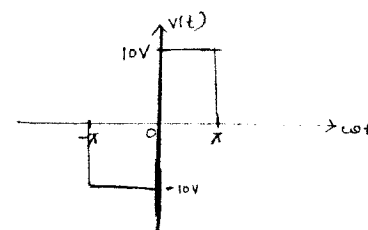 (b) Obtain the Fourier transform of the given waveform   (7)

OR

IX. (a) Find the trigonometric Fourier series for the triangular waveform shown in figure.   (8)

  (b) Find the exponential Fourier series for the waveform shown in figure.   (7)

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