D 23522 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2011

EE 04 306—ELECTRIC CIRCUIT THEORY

(2004 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

1. (a) Explain the unbalanced delta connected load of 3 ϕ system.

   (b) A 400V, 3ϕ supply feeds an unbalanced three wire star connected load. The branch impedances of the load are $Z_R = (4 + j8)\ \Omega$, $Z_Y = (3 + j\,4)\ \Omega$ and $Z_B = (15 + j\,20)\ \Omega$. Find the line currents (RYB).

   (c) Write a note on delayed standard time function.

   (d) The transform of current is $I(s) = \dfrac{2s}{(s+1)(s+2)}$. Sketch its pole-zero plot and obtain time domain response $i(t)$.

   (e) Design a low pass filter (both π and T section) having a cut-off frequency of 2 kHz to operate with a terminated load resistance of 500Ω.

   (f) Derive the expression of ABCD parameters in terms of z parameters.

   (g) Find the network for the function $Z(s) = \dfrac{(s+1)(s+3)}{(s+2)(s+6)}$ using Cauer I form.

   (h) Short note on 'fundamental circuit'

(8 × 5= 40 marks)

2. (a) Explain 3 wire and 4 wire systems in detail with diagrams. (15 marks)

Or

   (b) A delta-connected three-phase load has 10Ω between R and Y, 6.36 mH between Y and B, and 636 μF between B and R. The supply voltage is 400V, 50 Hz. Calculate the line currents of RBY phase sequence.

(10 marks)

   (c) Short note on 'sequence coupling'. (5 marks)

Turn over

3. (a) State and prove (i) Initial value theorem ; (ii) Final value theorem ; (iii) Convolution theorem of Laplace transform.

(7 marks)

(b) For the following network in Fig. 1,

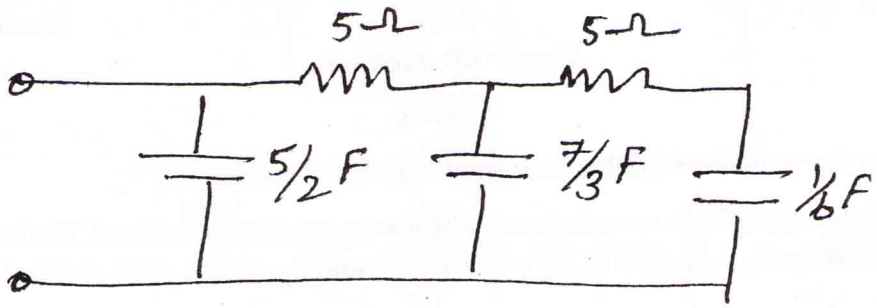

Fig. 1

Find Z (s) and plot pole-zero diagram.

(8 marks)

Or

(c) Using convolutional integral, find the Laplace inverse of , $F(s) = \frac{2(s+2)}{(s^2+4)^2}$. (7 marks)

(d) Find the driving point admittance function Y (s) and sketch pole zero plot Fig. 2

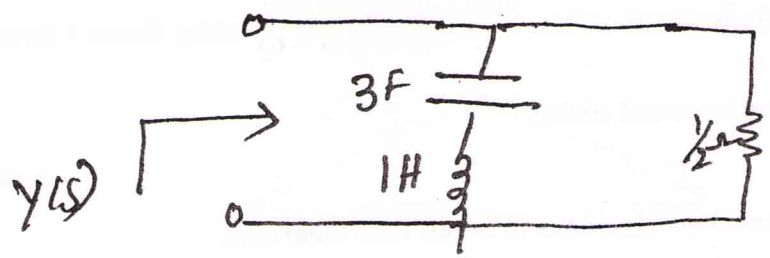

Fig. 2

(8 marks)

4. (a) Explain the interconnection of two port networks in detail. (15 marks)

Or

(b) Derive the equation of filter networks. (15 marks)

5 (a) Obtain the state equation of the network shown in Fig 3.

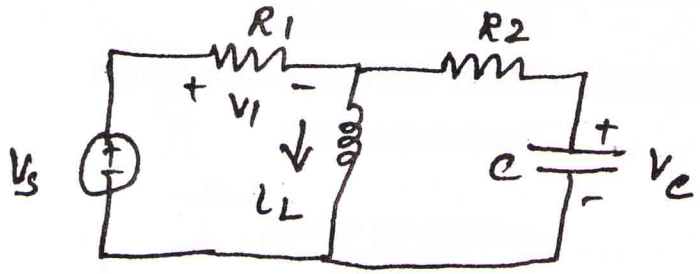

Fig. 3

(10 marks)

(b) Short note on 'properties of RL network function'. (5 marks)

Or

(c) The driving impedance of a one port LC network is given by $Z(s) = \frac{3(s^2+1)(s^2+16)}{5(s^2+9)}$.

Obtain the second Foster form of an equivalent network.

(8 marks)

(d) Select a tree and write the Fig 4 :

(i) Tie-set ma[illegible]

(ii) Cut-set m[illegible]

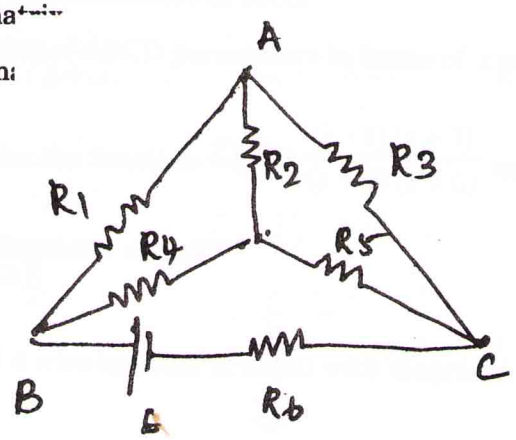

Fig. 4

(7 marks)

[4 × 15 = 60 marks]