Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Q 2201

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Third Semester

Electronics and Communication Engineering

EC 231 — NETWORK ANALYSIS AND SYNTHESIS

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find the impulse response for the network shown below.

2. Draw the equivalent circuit for z parameter.

3. What is PSPICE?

4. Define TREE, COTREE.

5. Find the location of poles and zeros for the network $\dfrac{(s+1)(s+4)}{s(s+2)}$.

6. What is network synthesis?

7. How will you transform band pass filter specifications to low pass filter specifications?

8. What are zeros of Transmission?

9. What are the different classifications of filter?
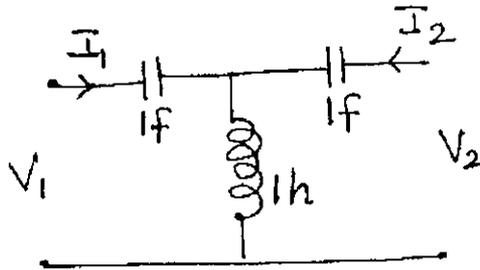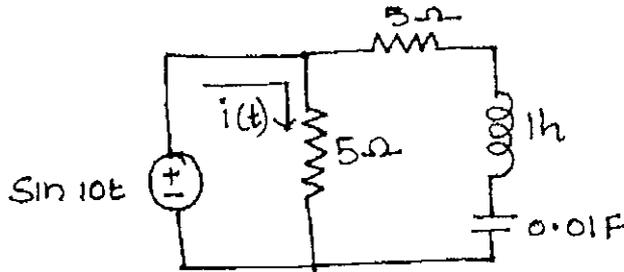
10. State the advantages of Active filter design.

PART B — (5 × 16 = 80 marks)

11. (a) Find the Hybrid and ABCD parameters for the given network.

Or

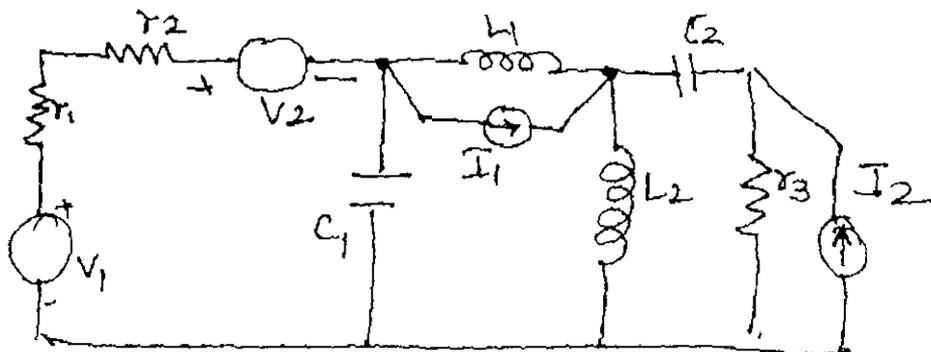(b) Calculate the steady state current response of the network.

12. (a) Find the time response for the unit step input of a system given

$$\dot{X}(t) = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} X(t) + \begin{bmatrix} 0 \\ 5 \end{bmatrix} u(t)$$

$$Y(t) = \begin{bmatrix} 0 & 1 \\ -2 & 3 \end{bmatrix} X(t) \text{ and } X(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}.$$

Or

(b) Draw the oriented graph of the network shown below and write incidence matrix.

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13. (a) Test the Hurwitz property of the following polynomial :

$$F(s) = s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4.$$

Or

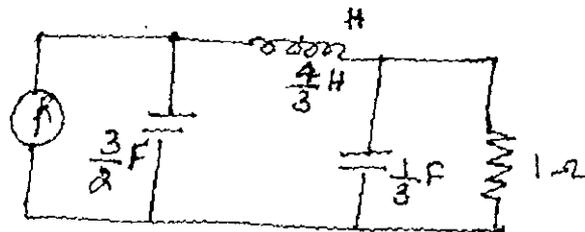(b) Realize the given driving point impedance function using Cauer forms (Cauer I and Cauer II)

$$Z(s) = \frac{4s^4 + 40s^2 + 36}{s^3 + 4s}.$$

14. (a) Synthesize a third order Butterworth low pass filter terminated in 1 ohm resistance having transfer function.

$$Z_{21} = \frac{1}{s^3 + 2s^2 + 2s + 1}.$$

Or

(b) (i) Convert a normalized third order low pass filter into High pass filter with $w_C = 10^6$ rad/sec, $R_L = 500\ \Omega$. (12)

(ii) What is Normalization in filter design? (4)

15. (a) (i) Explain how Op-Amps are used as controlled sources. (10)

(ii) List the characteristics of an Ideal Op-Amp. (6)

Or

(b) Design a high pass active filter with a cut-off frequency of 10 kHz with pass band gain of 1.5.

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