M 073

MODEL PAPER

B.E. DEGREE EXAMINATION.

Fourth Semester

Electrical and Electronics Engineering

EE 236 — NETWORK ANALYSIS AND SYNTHESIS

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the Laplace domain representations of an inductor of 2 H having an initial current of 4 mA.

2. Obtain the magnitude and phase response of the function $F(jw)=(jw)^2$.

3. Define tie–set matrix for a network graph.

4. What are the properties of a transfer function?

5. Express Z–parameters in terms of the Y–parameters.

6. List the fundamental difference between an RC and an LC impedance function.

7. What are transmission zeroes? Where do the transmission zeroes occur for a Low Pass Network?

8. Draw the normalized frequency response characteristic of a Butterworth Low Pass Filter and show the effect of increasing the filter order.

9. Discuss the merits of m–derived filters.

10. Show how you can connect two 2–port networks in parallel.

PART B

11. For the network shown in Figure 11, let $v_2(0)=1\,V$, $i_3(0)=0$ and $v_4(0)=0$. Set up matrix equations that can be solved for all branch currents and voltages. Use graph theoretical approach.

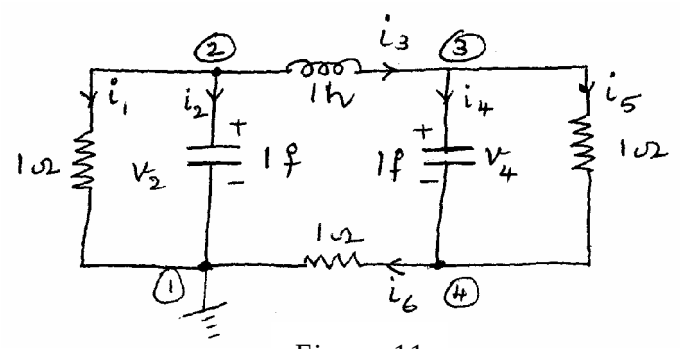

Figure 11

12. (a) For the network shown in Figure 12 (a), solve for the steady state transfer function $H(jw)$, assuming $v(t)$ as input and $v_c(t)$ as the desired response. Plot the amplitude and phase response of the network. $v(t)=5\cos\left(t-\frac{\pi}{4}\right)$.

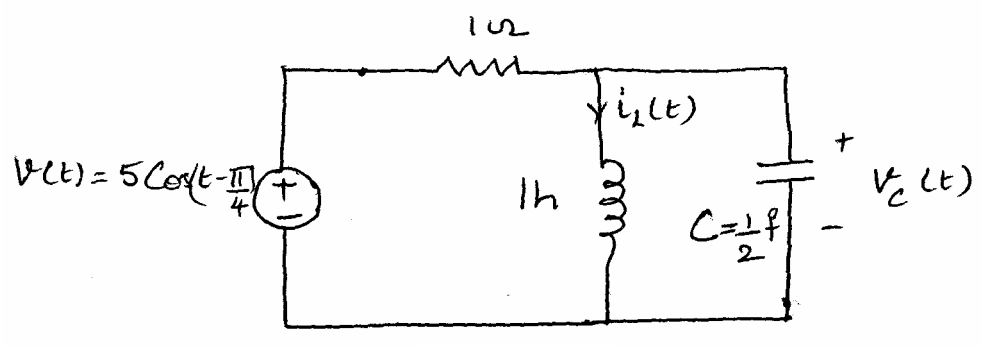

Figure 12 (a)

Or

(b) Draw the pole zero diagram for the given network function and obtain the time domain response $i(t)$.

$$I(s)=\frac{5s}{(s+1)(s^2+4s+8)}.$$

13. (a) Derive expressions for evaluating the driving point impedance at the output port of a network having a source impedance Z_S at the input, in terms of

(i) *Z*–parameters of the network, and

(ii) *Y*–parameters of the network.

Or

(b) Find the *Z*–parameters of the RC–ladder network shown in Figure 13 (b).

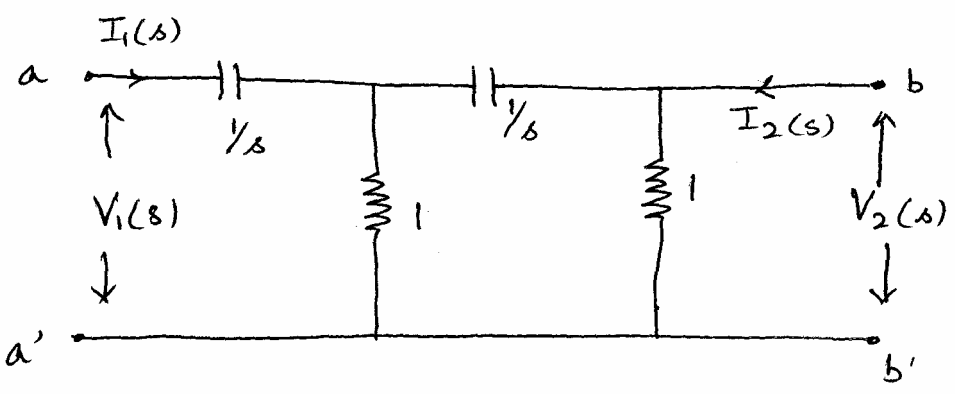

Figure 13 (b)

14. (a) Find the two Foster realizations of $Z(s)=\dfrac{4(s^2+1)(s^2+16)}{s(s^2+4)}$.

Or

(b) Find the two Cauer form realizations of $Z(s)=\dfrac{(s+3)(s+7)}{(s+2)(s+4)}$.

15. (a) Design a m–derived low pass filter having a cut–off frequency of 1 kHz, design impedance of $400\,\Omega$, and resonant frequency 1100 Hz. Obtain T–section and π–section filters.

Or

(b) (i) Discuss the different types of attenuators. (10)

(ii) Design a symmetrical bridged–T attenuator with an attenuation of 20 dB and terminated into a load of $500\,\Omega$. (6)

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