

[06 - 3217]

III/IV B.E. DEGREE EXAMINATION.

Second Semester

Electrical and Electronics Engineering

ADVANCED NETWORK THEORY

(Effective from the admitted batch of 2006-2007)

Time : Three hours

Maximum : 70 marks

Question No. 1 is compulsory.

Answer any FOUR from the remaining.

All questions carry equal marks.

(7 × 2 = 14)

1. (a) Write the differences between Fourier Transform and Laplace Transform.
- (b) Justify whether the following polynomial is Hurwitz or not.

$$F(s) = s^4 + s^3 + 5s^2 + 3s + 4$$

- (c) State and prove the duality theorem for continuous time Fourier transform.

6. (a) Which of the following functions are L-C driving point impedances? Why? (7)

$$Z_1(s) = \frac{s(s^2 + 4)(s^2 + 16)}{(s^2 + 9)(s^2 + 25)},$$

$$Z_2(s) = \frac{(s^2 + 1)(s^2 + 8)}{s(s^2 + 4)}$$

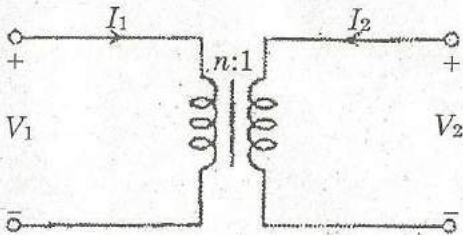
- (b) Synthesize the realizable impedance(s) in Foster form. (7)

7. Synthesize by continued fractions to the function below. Also draw the final structure. (14)

$$y(s) = \frac{s^3 + 2s^2 + 3s + 1}{s^3 + s^2 + 2s + 1}$$

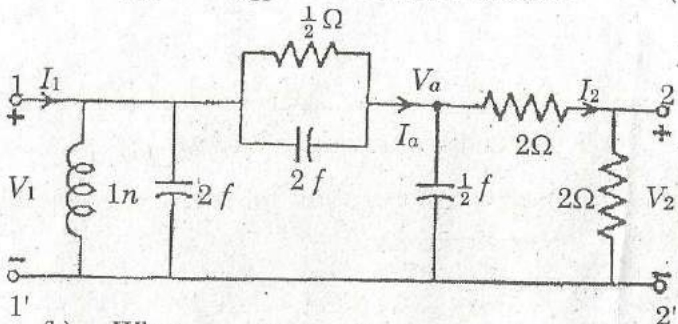
8. (a) Explain BRUNE's method of R-L-C network synthesis with an example. (8)
- (b) Write a brief note on minimum positive real function. (6)

- (d) Find the ABCD parameters of an ideal transformer whose circuit is shown below.



- (e) How to test whether a given function is positive real or not?
 (f) Define pole and zero of a transfer function by showing the pole-zero plot.
 (g) What are Foster and Cauer forms of realizations?

2. (a) Find the short circuit admittance functions y_{11} and y_{21} for the network below. (10)



- (b) What are open circuit parameters? Derive expressions for them. (4)

3. (a) Synthesize the positive real function below.
Draw the final structure. (10)

$$Z(s) = \frac{6s^3 + 3s^2 + 3s + 1}{6s^3 + 3s}$$

- (b) Write the basic properties of R-C network functions. (4)

4. Test the following for the Hurwitz property. (14)

(a) $s^3 + s^2 + 2s + 2$

(b) $s^4 + s^2 + s + 1$

(c) $s^7 + s^5 + s^3 + s$

(d) $s^3 + 4s^2 + 5s + 2$

(e) $s^5 + 2s^3 + s$

(f) $s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4$

5. (a) Using partial fraction and continuous fraction method, realize the following function. (10)

$$F(s) = \frac{3(s+2)(s+4)}{s(s+3)}$$

- (b) Write the properties of the Positive real functions. (4)