Code: R7310206

R7

B.Tech III Year I Semester (R07) Supplementary Examinations, May 2013

LINEAR SYSTEMS ANALYSIS

(Electrical and Electronics Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

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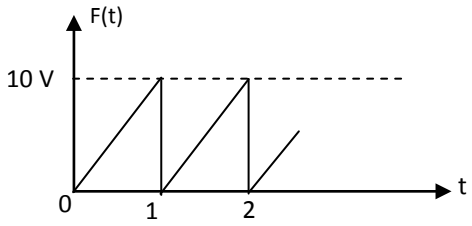
1 Develop the state model of field controlled dc servo motor and states the any assumptions made.

2 (a) Explain the exponential form of Fourier series.

(b) Find the trigonometric Fourier series for the waveform shown in below figure.



3 (a) Derive the RMS value of non-sinusoidal periodic current.

(b) A RL series network with R = 10 Ω and L = 5H contains a current $i_{(t)}$ = 5 sin 1000 t + 5 sin3000 t + 5 sin 5000 t. Determine the effective applied voltage, rms current and average power.

4 (a) Explain the convolution integral.

(b) At t = 0, a pulse of width 'a' and amplitude 2 is applied to a series RC circuit. Determine an expression for the current i(t).

5 (a) What are the conditions imposed on A(s) and B(s) if F(s) = A(s)/B(s) is to be a positive real function?

(b) F(s) = (s + a)/(s^2 + bs + c) where 'a', 'b', and 'c' are constants. Determine the conditions to be fulfilled by the constants for F(s) to be positive real. Hence test the following function for positive real character:

F(s) = (s + 1) / (s^2 + 2).

6 (a) Draw the general network configuration of first Foster form of reactive networks.

(b) Find the first Foster form of LC network for the impedance function:

Z(s) = s(s^2 + 2)/[(s^2 + 1) (s^2 + 3)].

7 A signal x(t) = Cos 200 πt + 0.25 Cos 700 πt is sampled at the rate of 400 samples per second. The sampled waveform is passed through an ideal low pass filter with 200 Hz bandwidth. Write the expressions for filter output. Draw neat diagrams depicting the:

(i) Frequency spectrum of x(t).

(ii) Frequency spectrum of sampled signal.

(iii) Frequency response of ideal low pass filter and

(iv) Frequency spectrum of the output signal of low pass filter.

8 (a) Explain z-plane and s-plane correspondence.

(b) Obtain x(n) for X(z) = ln(1+az^{-1}), $|z| > |a|$.

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