

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- Dec. 2017

B.Tech. 7th Semester (ECE)

COURSE CODE: Non-Linear and Digital Control System

MAX. MARKS:35

COURSE NAME: 14B1WEC734

COURSE CREDITS: 03

MAX. TIME: Two Hours

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q-1: (a) Explain the Jury's criterion for checking the stability of a discrete data system. [3]

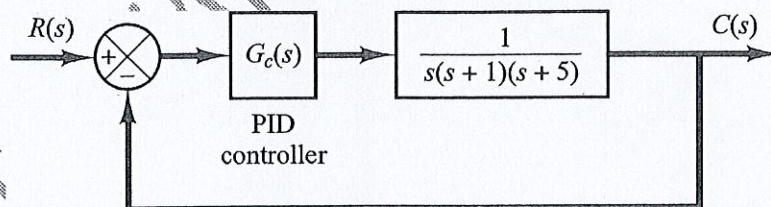
(b) Determine the stability of a discrete data system described by the following characteristic equations using Jury's Stability criterion. [4]

$$F(z) = z^5 + 2.6z^4 - 0.56z^3 - 2.05z^2 + 0.0775z + 0.35$$

$$F(z) = z^3 - 1.2z^2 - 1.375z - 0.25$$

Q-2: (a) Compare the First method and Second method of designing PID Controller using Ziegler-Nichol's technique. [2]

(b) Design the PID controllers required for the following system: [4]



Q-3: (a) Obtain the final value for the sequence whose z-transform is [3+3=6]

$$F(z) = \frac{z^2(z-a)}{(z-1)(z-b)(z-c)}$$

(b) Find and plot the impulse response for the following system:

$$y(k+1) - y(k) = u(k+1)$$

Q-4: Consider the simple harmonic motion as,

[3]

$$\frac{d^2x}{dt^2} + \omega_0^2 x = 0$$

Obtain the phase trajectory.

Q-5: In case of non-linear systems, explain the following properties:

[2*3=6]

- (a) Exhibits different behavior with different inputs,
- (b) Presence of limit cycles,
- (c) Generation of sub-harmonics

Q-6: (a) Describe the procedure for the selection of sampling frequency.

[2]

(b) Given a first-order system of bandwidth 10 rad/s, select a suitable sampling frequency and find the corresponding sampling period.

[2]

Q-7: Write short notes on any three:

[3]

- (a) Intentional type non-linearity
- (b) Reduced state observer
- (c) Nyquist criterion for the stability of discrete systems
- (d) Singular points

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