JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2021

B.Tech 3rd Semester ECE

COURSE CODE: 18B11EC311   MAX. MARKS: 35

COURSE NAME:AUTOMATIC CONTROL SYSTEMS

COURSE CREDITS: 03   MAX. TIME: 2 Hours

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

Qu-1: a) What is difference between linear and non-linear control systems?   (1)

a) Explain following types of non-linearity: Saturation, Dead zone.   (2)

b) Calculate the poles, zeros, order and degree of system in case of following system having transfer function:

$$G(s) = \frac{10(s+2)(s+3)}{s(s+1)(s+4)(s+5)}$$ (2)

c) Find the impulse response of system with transfer function

$$G(s) = \frac{10}{(s+1)}$$ (2)

Q-2: a) In case closed loop systems, what do you mean by the error signal?   (1)

b) When unit ramp input is applied, calculate the steady state error for the system having transfer function $G(s) = \frac{1}{(s+2)}$ (2)

c) In case of following system, calculate the undamped naural frequency and damping ratio:

$$G(s) = \frac{10}{(s+2)(s+2)}$$ (2)

d) What do you mean by the state-space model: Obtain the state model for the following transfer function:

$$G(s) = \frac{Y(s)}{U(s)} = \frac{10}{2s^2 + 3s + 1}$$ (2)

Q-3: a) What do you mean by the Bounded Input and Bounded Output (BIBO) stability? (1)

b) What is effect of pole location on the stability? (2)

c) Investigate the stability of following system having characteristic equation:

$$q(s) = s^3 + 2s^2 + s^1 + 3s \qquad (2)$$

d) Draw a root locus of system with having zero at -1 and pole at origin (2)

Q-4: a) If a system transfer function is having 2 pole and one zero, how many root locus branches will be there. (1)

b) What do you mean by the angle asymptotes? (2)

c) What do you mean by the centroid and breakaway points? (2)

d) Draw the root locus if a system is having poles on three different locations: 0, -1, -3 (2)

Q-5: a) Explain frequency response with example. (1)

b) What do you mean by the resonant peak and resonant frequency (2)

c) Draw the polar plots for the given transfer functions: i) $G(s) = s$, ii) $G(s) = 2 + s$ (2)

d) For case of bode plot, draw tentatively the magnitude and angle plots: (2)

$$G(s) = 10, \qquad G(s) = s^2$$

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