JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

M.Tech-I Semester (ECE)

COURSE CODE (CREDITS): 21M1WEC141 (3)　　　　MAX. MARKS: 35

COURSE NAME: Advanced Control Systems

COURSE INSTRUCTORS: Dr Rajiv Kumar　　　　MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required

for solving problems

Q.No	Question	CO	Marks
Q1	What is difference between linear and non-linear systems? What are different types nonlinearities?	CO-5	05
Q2	a) What do you mean by tuning? What are tuning rule for PID controllers? b) Write the transfer function of the following electronic PID controller 	CO-2	3+2=05
Q3	Obtain the transfer function from the following state space model:	CO-3	05

	$$\begin{bmatrix} \dot{x_1} \\ \dot{x_2} \\ \dot{x_3} \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -5.008 & -25.1026 & -5.03247 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 25.04 \\ -121.005 \end{bmatrix}u$$ $$y = [1 \quad 0 \quad 0]\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$			
Q4	Consider the transfer function of following system: $$\frac{Y(s)}{U(s)} = \frac{25.04s + 5.008}{s^3 + 5.03247s^2 + 25.1026s + 5.008}$$ Obtain the state space presentation. Check the system for controllability.	CO-4	05
Q5	Comment on the following design approaches in state space: i) Design by pole placement ii) Design of regulator type system iii) Design using state observer	CO-4	05
Q6	What do you mean by the mathematical modeling ? Explain the mathematical modeling of the following systems: i) Hydraulic system ii) Thermal System iii) Electrical System	CO-4	05
Q7	Explain in brief: i) Classical control vs modern control ii) Transfer function vs state-space approach iii) Time-response approach vs frequency response approach	CO-4	05