JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

M.Tech-I Semester (ECE)

COURSE CODE (CREDITS): 21M1WEC141 MAX. MARKS: 25

COURSE NAME: Advanced Control Systems

COURSE INSTRUCTORS: Dr Rajiv Kumar MAX. TIME: 1 Hour 30 Minutes

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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 do you mean by the PID control of plant? What is second method of PID tuning and how it is different from the first method tuning?	CO-1	5
Q2	Calculate the transfer function model from the state space model for which matrix A, B, C, D are as follows: $A=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -3 & -4 & -2\end{bmatrix}$; $B=\begin{bmatrix}0\\0\\1\end{bmatrix}$; $C=\begin{bmatrix}5 & 1 & 0\end{bmatrix}$; $D=0$ Calculate the Eigen values of this system.	CO-1	5
Q3	Obtain the response y(t) of the following system: $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}-1 & -0.5\\ 1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0.5\\0\end{bmatrix}u$ $y=\begin{bmatrix}1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}$ Where; all the initial conditions are zero. U is unit step input	CO-1	5
Q4	Consider the following system :	CO-3	5

	$\dddot{y} + 6\ddot{y} + 11\dot{y} + 6y = 6u$ Obtain a state-space representation of this system in a diagonal canonical form.		
Q5	Define controllability and observability of a system. How to present the state-space in following different forms: i) Controllable canonical form ii) Observable canonical form iii) Diagonal canonical form iv) Jordan canonical form	CO-4	5