JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

B.Tech-VII Semester (OE)

COURSE CODE (CREDITS): 20B1WEC731 (3)   MAX. MARKS: 25

COURSE NAME: Automation and Robotics
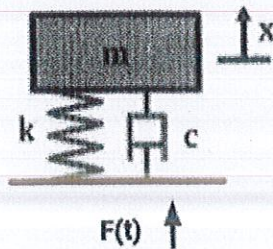
COURSE INSTRUCTORS: Dr Emjee Puthooran   MAX. TIME: 1 Hour 30 Minutes

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	A Stepper Motor has 30 teeth and 4 step for 1 tooth. Compute the step angle of the stepper motor.	CO-4	2
Q2	With a neat sketch, briefly explain the working of a Teleoperated Manipulator.	CO-3	2
Q3	What is the working of a four-element (Wheatstone bridge) strain gauge sensor? Compare the advantages and disadvantages of of four-element method with single element method.	CO-4	3
Q4	What are the "Three laws of Robotics" postulated by Issac Asimov for the ethical conduct of robots, to avoid the dangers and havoc they could cause.	CO-3	3
Q5	Find the transfer function between the displacement x(t) and the force applied F(t) of the Mass Spring Dashpot System, used in a vehicle suspension system. Mass, m = 5000kg, Damping coefficient, c = 150 kg/s, Spring constant, k = 7kg/s^2. Design a PID controller using Ziegler-Nichols criteria, if the system has a critical gain, Kc=12 and the period of oscillations, Pc=3s.	CO-2	5

Q6	For a process control, it is desired to have the process start by turning ON a motor five seconds after a part touches a limit switch. The process is terminated automatically when the finished part touches a second limit switch. An emergency switch will stop the process any time when it is pushed. Design a ladder logic program for PLC and explain its working.	CO-2	5
Q7	With a neat sketch, list and explain the different elements and features of Supervisory Control and Data Acquisition (SCADA) used in industrial applications.	CO-2	5