JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

B.Tech-VII Semester (OE)

COURSE CODE (CREDITS): 20B1WEC731 (3)　　　　　　MAX. MARKS: 25
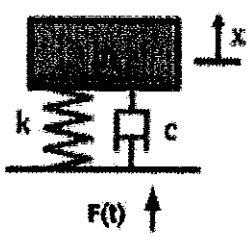
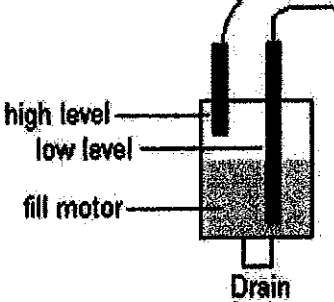COURSE NAME: Automation and Robotics

COURSE INSTRUCTORS: Dr Emjee Puthooran　　　　　MAX. TIME: 1 Hour 30 Min

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	Define and distinguish between a 'sensor' and an 'actuator'. Which of these devices is identified as a specific type of a transducer that uses energy to provide motion?	CO-4	2
Q2	Describe the characteristics of 'Batch Production' systems. Explain how they manage product variation and utilize equipment compared to continuous-flow processes.	CO-1	3
Q3	(a) Compare the standard DC Motor with the Stepper Motor based on the following characteristics: 　　i. Requirement for large current. 　　ii. Ability to offer precision control or accuracy. (b) Explain the mechanism used in Motor Drivers to control the direction of a DC motor. Specifically, how do the electronic switches (MOSFETs) arranged in an H-Bridge facilitate current reversal? Which two specific MOSFETs must be turned ON for the current to travel from right to left through the motor.	CO-4	5
Q4	Write a Python program to simulate a mass-damper-spring system shown below. Plot the output of the system with unity feedback to a unit step input with a PID controller. 	CO-3	5

Q5	(a) Describe the architecture of a Distributed Control System (DCS) by naming and briefly explaining the function of the four key architectural levels. (b) The Remote Terminal Unit (RTU) is a key element of SCADA systems. List two primary functions of the RTU in relation to field devices and data transmission. Additionally, list two major industrial applications of SCADA systems.	CO-2	5
Q6	Oil is consumed randomly from an oil tank. The tank needs to be refilled by turning on a pump. Two hydrostatic switches are used to detect a high and low level. The pump should be switched ON if the oil level goes below the low hydrostatic switch. The pump should be switched OFF if the oil level goes above the high hydrostatic switch. A PLC is used to control the pump. Draw a suitable Ladder Logic Diagram for this problem and explain its function. high level low level fill motor Drain	CO-2	5