JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Make-up Examination-Nov-2025

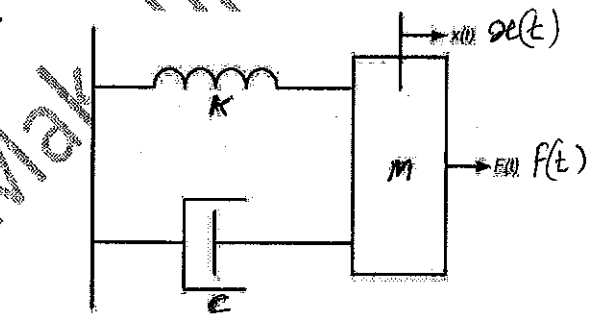
COURSE CODE (CREDITS):20B1WEC731 (3) MAX. MARKS: 25

COURSE NAME: Automation and Robotics

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

***Note: 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 | List the various factors that contribute to the cost/unit and overall production time in an industry. Describe how industrial automation can maximize the profit of an industry. | CO1 | 2 |
| Q2 | Outline the defining features of batch production systems. Discuss how they accommodate product diversity and utilize machinery in contrast to continuous-flow production methods. | CO1 | 3 |
| Q3 | Describe the operational principles of a strain gauge sensor. Using appropriate circuit diagrams, illustrate how force is measured with a single-element strain gauge versus a four-element strain gauge setup. Outline the benefits of employing four-element strain gauge sensors. | CO3 | 5 |
| Q4 | Develop a Python script to model the behavior of the mass-spring-damper system depicted below. Generate a plot showing the system's response under unity feedback to a unit step input, incorporating a PID controller.   | CO3 | 5 |
| Q5 | 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 |





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| Q6 | (a) Describe the structure of a Distributed Control System (DCS), identifying and briefly explaining the roles of its four primary architectural layers.<br>(b) The Remote Terminal Unit (RTU) is a critical component in SCADA systems. State two main functions of the RTU with respect to field devices and data communication. Furthermore, mention two significant industrial sectors where SCADA systems are widely deployed. | CO-2 | 5 |