



**SCHOOL OF MECHANICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST (CAT) -II
FALL SEMESTER 2024-2025**

REG.NO.: 22BMED0183

Programme Name & Branch : B.Tech & Mechanical Engineering
Course Code : BMEE210L
Course Name : Mechatronics and Measurement Systems
Faculty Name(s) : M. Boopathi, N. Senthilnathan, Sathish Paulraj GP,
Bharanidaran R, DRS. Raghuraman
Class Number(s) : VL2024250103803, VL2024250108099,
VL2024250103801, VL2024250103802,
VL2024250103800
Exam Duration : 90 minutes Maximum Marks: 50

Answer all

General instruction(s):

- M - Max mark; CO – Course Outcome; BL – Bloom's Taxonomy Level (1 - Remembering, 2- Understanding, 3 - Applying, 4 - Analysing, 5 - Evaluating, 6 - Creating)
- Course Outcomes
CO. 3: Compare various types of sensors and actuators used in mechatronics systems

Q. No	Question	M	CO	BL
1.	How would you implement strain gauges to measure stress distribution across the foot? What specific stress states would you measure, and how would a Wheatstone bridge detect resistance changes? Explain the basic working principle of the strain gauge and its suitability for this application.	10	CO 3	BL3
2.	In metal casting, where precise temperature control is essential, how would you choose between a thermocouple, an electrical resistance thermometer, and a bimetallic strip? Explain their basic principles and identify the most suitable option for high-temperature, low-temperature, and cost-sensitive applications.	10	CO 3	BL3
3.	How would you use piezoelectric accelerometers for high-frequency vibrations and IMUs/Gyroscopes for rotational dynamics in aircraft wings or rocket engines? Discuss their principles and how sensitivity, frequency range, and durability affect your sensor choice for aerospace applications.	10	CO 3	BL3
4.	Design an automated irrigation system for precision agriculture. Specify where you would use stepper motors, solenoids, and relays in your design. Include sketches and explain the basic principles of each component.	10	CO 3	BL6
5.	In a hydraulic door closer system, how would you design the hydraulic system to ensure smooth and controlled closing of the door? Discuss the selection of hydraulic valves and their role in controlling the door's movement. Include sketches to show your design and explain how basic hydraulic principles enable smooth motion and control of the door's speed.	10	CO 3	BL6

