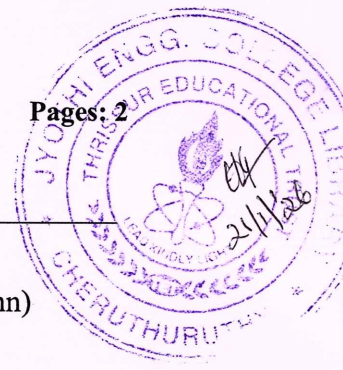


Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S3 (Minor) Examination November 2025 (2024 Admn)



Course Code: MNRUT309

Course Name: FUNDAMENTALS OF INSTRUMENT TECHNOLOGY

Max. Marks: 60

Duration: 2 hours 30 minutes

PART A

(Answer all questions. Each question carries 3 marks)

		CO	Marks
1	Explain Asimov's three laws of robotics.	1	(3)
2	Mention any three applications of aerial robots.	1	(3)
3	Differentiate exteroceptive sensors from proprioceptive sensors with suitable examples.	2	(3)
4	Explain any three dynamic characteristics of robotic sensors.	2	(3)
5	Explain how Seebeck effect can be used to realize a temperature sensor.	3	(3)
6	Explain the principle of operation of an ultrasonic ranging sensor.	3	(3)
7	List the ideal characteristics of actuators.	4	(3)
8	Differentiate a DC motor from a DC servo motor.	4	(3)

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module -1

9	a)	Explain the main components of a robotic system.	1	9
10	a)	Describe the features and applications of autonomous and humanoid robots.	1	6

- | | | | |
|----|---|---|---|
| b) | Mention any three safety mechanisms used in cobots. | 1 | 3 |
|----|---|---|---|

Module -2

- | | | | | |
|----|----|--|---|---|
| 11 | a) | Explain the working of an eddy current proximity sensor with a neat schematic diagram. | 2 | 6 |
| | b) | Explain the working of piezoelectric sensor. | 2 | 3 |
| 12 | a) | Illustrate the working principle of resistive and capacitive touch sensors and compare their advantages and disadvantages. | 2 | 9 |

Module -3

- | | | | | |
|----|----|---|---|---|
| 13 | a) | A robot used for warehouse automation must detect obstacles, identify temperature variations, and maintain stable motion. Suggest a suitable combination of sensors for this robot and justify the role of each sensor in fulfilling these tasks. | 3 | 5 |
| | b) | Explain any one type of accelerometer. | 3 | 4 |
| 14 | a) | Explain the working of LVDT with a neat schematic diagram. | 3 | 6 |
| | b) | Mention any three applications of encoder sensors. | 3 | 3 |

Module -4

- | | | | | |
|----|----|--|---|---|
| 15 | a) | Explain the construction and working principle of stepper motor with suitable diagram. | 4 | 6 |
| | b) | Describe the functions of the stator and rotor in an AC motor. | 4 | 3 |
| 16 | a) | Explain the working of a hydraulic actuator with neat schematic diagram. | 4 | 6 |
| | b) | List the advantages of pneumatic actuators for robotic applications. | 4 | 3 |
