



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
