Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (R,S) Examinations April 2026 (2019 Scheme)

Course Code: RAT342

Course Name: MECHANICAL MEASUREMENTS AND METROLOGY

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1		List the applications of optical dividing head.	(3)
2		'During measurement, an instrument shows different readings while increasing and decreasing input'. Identify the type of error and explain its causes.	(3)
3		Define 'gauge factor' of a strain gauge. Write its significance.	(3)
4		Explain the principle of operation of absorption dynamometers?	(3)
5		Explain the working of a resistive potentiometer?	(3)
6		Why are platinum wires used for the construction of RTD?	(3)
7		State the objectives of metrology.	(3)
8		Define the terms 'pitch' and 'lead' of a screw thread.	(3)
9		Explain the concept of CMM and List any three types of it.	(3)
10		Briefly explain the working of a profilometer.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	With the help of a neat sketch, describe the method of angular measurement using a sine bar. Also state any two limitations of sine bar.	(8)
	b)	Explain the static performance characteristics of measuring instruments.	(6)

OR

12	a)	Explain the components of a generalized measurement system with a neat block diagram.	(6)
	b)	Draw a neat labelled diagram of a micrometre. How is the least count of a micrometre calculated?	(8)

Module II

13	a)	Explain the measurement of torque using torsion bar dynamometer.	(7)

b) Explain the necessity for temperature compensation methods in a strain gauge and briefly describe any one method. (7)

OR

14 a) Describe the construction and working of a rope brake dynamometer with the help of a neat sketch. (7)

b) Explain the construction and working of a hydraulic load cell using a diagram. (7)

Module III

15 a) Describe the working principle of thermocouple with the help of a diagram. (4)

b) Explain the construction and working of LVDT with advantages and disadvantages. (10)

OR

16 a) Discuss the construction and working of piezoelectric accelerometers. (6)

b) Explain the working of an optical pyrometer using a neat sketch. (8)

Module IV

17 a) Illustrate the construction and use of gear tooth vernier caliper. (9)

b) Describe the working principle of an optical flat. (5)

OR

18 a) Draw a neat labelled diagram of Tool maker's microscope. Also mention its applications. (9)

b) Compare line standard and end standard of measurement. (5)

Module V

19 a) How does an optical comparator achieve high-precision magnification? Detail its internal components using an illustrative figure. (10)

b) Distinguish between contact probes and non-contact probes. (4)

OR

20 a) In the measurement of surface roughness, heights of successive ten peaks and troughs were measured from the datum as 35, 25, 32, 20, 23, 18, 26, 24, 28 and 21 microns. If these measurements were obtained on 10 mm length, determine CLA and RMS values of average surface roughness. (6)

b) Explain the elements of surface texture with the help of a diagram. (8)

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