A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: R3706

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Third Semester

Mechanical Engineering

R21UME306 - MEASUREMENTS AND INSTRUMENTATION

(Regulations R2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The ability by which a measuring device can detect small differences in the quantity being measured by it, is called its _____ CO1-U

   (a) Damping (b) Sensitivity (c) Accuracy (d) None of the above

2. Error of measurement _____ CO1-U

   (a) True value – Measured value (b) Precision – True value

   (c)Measured value – Precision (d) None of the above

3. The following is not used to measure angles _____. CO1-U

   (a)Bevel protectors (b) Calibrated levels (c)Clinometers (d) Optical flats

4. To check external diameter of hole, we use _____. CO1-U

   (a) Plug gauge (b) Ring gauge

   (c) Slip gauge (d)Standard screw pitch gauge

5. What is the accuracy of present day co-ordinate measuring machine? CO1-U

   (a) 10 microns (b) 5 microns (c) 2 microns (d) 1 micron

6. An application of machine vision in manufacturing is _____. CO1-U

   (a) Tool sharpening (b) Automated defect detection

   (c) Lubrication (d) Cooling

7. Which device uses a curved elastic tube for pressure measurement? CO1-U

(a) Manometer (b) Bourdon tube

(c) Thermistor (d) Pyrometer

8. Which type of manometer can measure very small pressure differences? CO1-U

(a)U-tube manometer (b) Inclined tube manometer

(c) Bourdon tube (d) Dead weight tester

9. Which transducer converts light into electrical signal? CO1-U

(a) Photodiode (b) Strain gauge

(c) RTD (d) LVDT

10. The basic element of a data acquisition system (DAS) is _____. CO1-U

(a) Actuator (b) Multiplexer

(c) Sensor/transducer (d) Microphone

PART – B (5 x 2= 10 Marks)

11. Distinguish between precision and accuracy. CO1-U

12. Classify any four angular measuring instruments CO1-U

13. Summarize the features of CMM software. CO1-U

14. Outline load cells? CO1-U

15. Distinguish between active and passive sensors. CO1-U

PART – C (5 x 16= 80 Marks)

16. (a) Draw the block diagram of generalized measurement system and explain different stages with examples. CO1 - U (16)

Or

(b) Apply various errors in measurement and suggest techniques to reduce or correct them. CO1 - U (16)

17. (a) Apply the working principle of Mechanical and Pneumatic Comparators to evaluate dimensional tolerances in precision manufacturing. CO2- App (16)

Or

(b) Apply interferometry principles in the measurement of surface flatness using an optical flat. Discuss the merits and demerits. CO2- App (16)

18. (a) Distinguish the procedure to be used in measurement of various CO3- App (16)

dimensions of a typical component using a cantilever type CMM.

Or

	(b)	Apply the principle of machine vision with robotics to automate sorting of good and defective weld joints. Draw a neat schematic of the setup.	CO3- App	(16)
19.	(a)	Apply thermocouples for real-time temperature monitoring in gas turbine engines, and with a neat schematic, explain their working principle, industrial applications, merits, and demerits.	CO4- App	(16)

Or

	(b)	Apply bonded strain gauges for monitoring stresses in aircraft wings with neat schematic, explain construction and operation, and discuss industrial uses, merits and demerits	CO4- App	(16)
20.	(a)	Apply a resistive transducer for monitoring displacement in CNC machines with neat schematic, explain its operation, and justify industrial applications.	CO5- App	(16)

Or

	(b)	Make use of piezoelectric transducers to capture vibration signals in turbine blades and relate the data to fault diagnosis.	CO5- App	(16)