Code No. : 16545 N

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. (Mech. Engg.) VI-Semester Main Examinations, May/June-2023
Metrology & Instrumentation

Time: **3 hours**

Max. Marks: **60**

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Define Fit. List the types of fits and give examples for each.	2	1	1	1
2.	Arrange the Angle gauges to obtain the following angles: a) 23deg 17 min 24sec b) 45deg 25 min 42 sec.	2	1	1	1
3.	Define the Geometrical feature - Straightness of an object.	2	1	2	1
4.	Draw the symbol of surface roughness and mention all the parameters on it.	2	2	2	1
5.	What is uncertainity and how it can be measured?	2	1	3	1
6.	List the various thermocouple Materials.	2	1	3	1
7.	With Reference to resistance strain gauges, define Quarter bridge and Half bridge	2	1	4	1
8.	What is telemetering?	2	1	4	1
9.	Sketch any one type of accelerometer and indicate its various parts.	2	1	5	1
10.	List the instruments used to measure vacuum pressure.	2	1	5	1

Part-B (5 × 8 = 40 Marks)

		M	L	CO	PO
11. a)	Explain how interchangeability is useful in our day to day life.	3	3	1	1
b)	A 35 mm shaft and hole pair of H7d8 is as per I.S specification. Assumptions made: 35 mm lies between 30 mm and 50 mm and upper deviation for 'd' type shaft is $-16D^{0.44}$ microns. Consider IT 7 = 16i and IT8 = 25i. Determine the Maximum and Minimum sizes of hole and shaft. Also design for the gauges taking 10% Gauge tolerance and 10% wear Allowance.	5	4	1	1,3
12. a)	Explain the construction and working of Auto Collimator.	4	2	2	1
b)	Explain how roundness of a specimen is measured using Talyround measuring machine.	4	2	2	1

			M	L	CO	PO
13.	a)	Classify the various errors in measurement systems and explain each of them.	4	2	3	1
	b)	State the laws of thermo-electricity and give applications for each law.	4	2	3	1
14.	a)	With a neat Sketch, Explain the construction and working of Linear variable differential Transformer.	5	2	4	1
	b)	Derive the relationship between gauge factor and strain in case of resistance strain gauges.	3	4	4	1
15.	a)	Explain the construction and working of Bourdon tube pressure gauge with a neat Sketch.	4	3	5	1
	b)	What kind of pressures do pirani gauge measure? Explain its working with a neat Sketch.	4	2	5	1
16.	a)	Explain the construction and working of Sine bar. What are its limitations?	4	3	1	1
	b)	List the various types of CMM and mention the advantages of each .	4	3	2	1,5
17.		Answer any *two* of the following:				
	a)	Discuss the various elements of General Measurement system.	4	2	3	1
	b)	Explain the principle of Force measurement using Proving Ring.	4	2	4	1
	c)	Describe the Components of Data Aquisition Systems.	4	1	5	1,5

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	24%
ii)	Blooms Taxonomy Level – 2	28%
iii)	Blooms Taxonomy Level – 3 & 4	48%

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