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Code No. : 15532 S

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD**

*Accredited by NAAC with A++ Grade*

**B.E. (Mech. Engg.) V-Semester Supplementary Examinations, June-2022**

**Metrology and 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 Interchangeability and list the types of interchangeability.	2	1	1	1
2.	Why Sine bar is not regarded as a direct measuring instrument?	2	1	1	2
3.	Explain the terms lay and waviness with respect to surface texture of a component.	2	2	2	1
4.	Define Straightness and Flatness.	2	1	2	1
5.	A thermometer reads $83.5^{\circ}C$ and the true value of the temperature is $83.15^{\circ}C$ . Determine the error and correction for the given Thermometer.	2	3	3	1
6.	Differentiate between error and Uncertainty.	2	3	3	1
7.	Explain the principle of a strain gauge to find the strain of a component.	2	2	4	3
8.	Define a Load cell and list the various types of load cells	2	1	4	1
9.	Explain the terms Gauge Pressure and Vacuum Pressures.	2	3	5	1
10.	What is the importance of Data Acquisition Systems in an industry?	2	1	5	5
<b>Part-B (5×8 = 40 Marks)</b>					
11. a)	Differentiate between Hole Basis System and Shaft Basis system of Fits.	3	3	1	1
b)	Determine the GO and NOGO limits for a 35H8e9 type clearance fit. The basic size falls between the diameter steps 30mm and 50 mm. Fundamental deviation for 'e' type shaft is $-11D$ power 0.41. Tolerance grade IT8 = 25i; IT9 = 40i.	5	3	1	2
12. a)	With neat sketches, Explain the different ways by which roundness is measured using Talyrond roundness measuring machine	4	2	2	5
b)	Explain the principle and process of measuring surface roughness using Taylor hobson Talysurf Instrument.	4	1	2	5

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13. a)	List and explain the Static and dynamic characteristics of an Instrument with suitable examples.	5	2	3	1
b)	Explain the laws of thermo-Electricity with neat sketches.	3	1	3	2
14. a)	Describe the working Principle of Linear variable Differential Transducer ( LVDT ) with a neat sketch and mention its advantages and disadvantages.	5	3	4	5
b)	Derive an expression to find the Gauge factor of a Resistance strain gauge	3	4	4	3
15. a)	Describe the working Principle of Bulk Modulus gauge and Pirani gauge with neat sketches.	5	3	5	1
b)	Explain the working Principle of strain gauge accelerometer with a neat sketch	3	1	5	4
16. a)	List the types of fits in an assembly with neat sketches.	4	1	1	1
b)	List and explain the various types of CMM's with neat sketches and mention their advantages	4	3	2	5
17.	Answer any <i>two</i> of the following:				
a)	Describe the working principle of a Thermocouple with neat sketch.	4	3	3	3
b)	Derive the expression for the output voltage in case of strain gauge load cell	4	4	4	2
c)	Explain the working principle of Bourdon tube Pressure gauge.	4	3	5	1

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

i)	Blooms Taxonomy Level - 1	20
ii)	Blooms Taxonomy Level - 2	35
iii)	Blooms Taxonomy Level - 3 & 4	45

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