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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## January / February 2025 Semester End Main Examinations

**Programme: B.E.** **Semester: III**
**Branch: Industrial Engineering and Management** **Duration: 3 hrs.**
**Course Code: 22IM3PCIME** **Max Marks: 100**
**Course: Industrial Metrology**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | | UNIT - I | *CO* | *PO* | Marks |
|---|---|---|---|---|---|---|
| 1 | a) | | What is the purpose of calibration in measurement system? | *CO1* | *PO1* | **06** |
| | b) | | Contrast between Line Standard and End Standard with examples | *CO2* | *PO2* | **06** |
| | c) | | Evaluate limits and fits for an assembly pair 6 H7/ g6 mm and determine the type of fit<br>i) The size 6 mm lies in the diameter step of 3-6 mm<br>ii) i (microns)= $0.45D^{1/3}+0.001D$<br>iii) Fundamental deviation of the H hole=0<br>iv) Tolerance for hole H7=16i<br>v) Tolerance for g6 shaft=10i | *CO3* | *PO3* | **08** |
| | | | **OR** | | | |
| 2 | a) | | State and explain the Taylor's principle of gauge design. | *CO4* | *PO3* | **05** |
| | b) | | Explain the characteristics of Linear Variable Differential transformer (LVDT) and with a legible sketch explain the working and construction of LVDT | *CO3* | *PO2* | **07** |
| | b) | | Explain the working and construction of Solex pneumatic comparator. List the advantages of Solex comparator over any mechanical comparator. | *CO3* | *PO3*<br>*PO12* | **08** |
| | | | **UNIT - II** | | | |
| 3 | a) | | Explain the various elements of Screw thread with the illustration and which element of screw thread can be determined by two wire and three wire methods? Which method is accurate among two and three wire methods? | *CO2* | *PO2* | **08** |
| | b) | | With an aid of the diagram explain how to determine the taper angle of a given specimen with the help of Sine centers | *CO3* | *PO2* | **08** |
| | c) | | What are advantages of Angle gauges over Sine bar and Sine center | *CO3* | *PO2* | **04** |
| | | | **OR** | | | |
| 4 | a) | | With the neat representation define the following with the help of Gear measurements:<br>i) Blank Diameter<br>ii) Pitch circle | *CO1* | *PO1* | **10** |

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|---|---|---|---|---|---|---|
| | | | iii) Face width<br>iv) Addendum circle<br>v) Flank | | | |
| | | b) | With an aid of the neat sketch explain how Bench Micrometer is used to measure major diameter for an external thread. | *CO2* | *PO2* | **10** |
| | | | **UNIT-III** | | | |
| | 5 | a) | How is the surface roughness designated in terms of basic symbol? With the illustration explain the indication of any one surface roughness values in the surface finish symbols | *CO2* | *PO2* | **10** |
| | | b) | Describe the principle and operations of Tomlinson Surface Meter instrument with the help of a diagram. | *CO2* | *PO2* | **10** |
| | | | **OR** | | | |
| | 6 | a) | With the neat representation define the following with the help essentials of Surface Texture:<br>i) Waviness<br>ii) Roughness width<br>iii) Lay<br>iv) Crater<br>v) Nominal surface | *CO1* | *PO1* | **10** |
| | | b) | What are the 4 geometrical irregularities identified on surface texture? Explain the same with the causes | *CO1* | *PO1* | **10** |
| | | | **UNIT - IV** | | | |
| | 7 | a) | Obtain a network of generalized measurement system and explain the three stages of measurement system | *CO3* | *PO2* | **06** |
| | | b) | What are systematic errors? What are the causes of these types of errors | *CO2* | *PO2* | **06** |
| | | c) | Differentiate between:<br>(i) Primary and secondary<br>(ii) Active and Passive<br>(iii) Direct and invert<br>(iv) Analog and digital types of Transducers | *CO2* | *PO2* | **08** |
| | | | **OR** | | | |
| | 8 | a) | What are the various methods of sensing the temperature? With the illustration explain working principle of thermocouple. | *CO2* | *PO2* | **10** |
| | | b) | With a neat diagram explain the construction and working of optical pyrometer | *CO3* | *PO3* | **10** |
| | | | **UNIT - V** | | | |
| | 9 | a) | Explain various types of Laser source optical elements. | *CO3* | *PO3* | **06** |
| | | b) | Explain what is the phenomena of interaction of Light? What are various types of interferometers. | *CO2* | *PO2* | **06** |
| | | c) | Explain the difference between the cantilever and Bridge type Coordinate Measuring Machines | *CO3* | *PO3* | **08** |
| | | | **OR** | | | |
| | 10 | a) | Define CMM. Mention and describe its classification and application of each type. | *CO1* | *PO1* | **10** |
| | | b) | Briefly explain how 3D scanner is used for measurements. Explain briefly its application in various fields. | *CO1* | *PO1* | **10** |

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