



**B.E DEGREE EXAMINATIONS: NOV/DEC 2022**

(Regulation 2018)

Fifth Semester

**MECHANICAL ENGINEERING**

U18MEI5202: Engineering Metrology and Quality Control

**COURSE OUTCOMES**

- CO1: Apply knowledge of linear and angular measurements and effective communication for engineering practice.
- CO2: Apply knowledge of form measurements with effective communication for engineering application.
- CO3: Explain the working principles of advanced instruments / equipment's used in metrology.
- CO4: Construct various control charts for the variables and attributes.
- CO5: Apply knowledge of various sampling methods, concepts and reliability.

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

- |   |     |                   |
|---|-----|-------------------|
| 1. Draw a micrometer sketch that indicates the reading of 24.73 mm. | CO1 | [K <sub>2</sub> ] |
| 2. Tell about the process of 'Wringing' in slip gauge.              | CO1 | [K <sub>1</sub> ] |
| 3. Differentiate straightness and flatness.                         | CO2 | [K <sub>2</sub> ] |
| 4. Outline about composite errors in gears.                         | CO2 | [K <sub>2</sub> ] |
| 5. List out the advantages of machine vision system.                | CO3 | [K <sub>2</sub> ] |
| 6. Define nanometrology.  | CO3 | [K <sub>1</sub> ] |
| 7. List out various limitations of SQC.                             | CO4 | [K <sub>2</sub> ] |
| 8. Compare chance cause and assignable causes.                      | CO4 | [K <sub>2</sub> ] |
| 9. Define acceptance sampling                                       | CO5 | [K <sub>1</sub> ] |
| 10. Outline the purpose of 'lot by lot sampling'.                   | CO5 | [K <sub>2</sub> ] |

**Answer any FIVE Questions:-**

**PART B (5 x 16 = 80 Marks)**

**(Answer not more than 400 words)**

- |   |     |                   |
|---|-----|-------------------|
| 11. a) Elaborate the procedure for angular measurement by using sine bar and slip gauges for the following cases,<br>(i) Locate any workpiece component to a given angle.<br>(ii) Measure an unknown angle for small size workpiece components. | CO1 | [K <sub>2</sub> ] |
|---|-----|-------------------|

- |     |    |  |    |     |                   |
|-----|----|--|----|-----|-------------------|
| 12. | a) | Derive a formula to find the effective diameter of a screw thread using three wire method and explain how the best size of wire is selected. | 16 | CO2 | [K <sub>3</sub> ] |
| 13. | a) | Illustrate the construction and working principle of tool makers microscope with its advantages and applications.                            | 16 | CO3 | [K <sub>2</sub> ] |
| 14. | a) | Summarize the needs, types & constructional features of Coordinated Measuring Machine (CMM).   | 16 | CO3 | [K <sub>2</sub> ] |
| 15. | a) | Discuss the procedure to construct X bar and R chart with suitable case example.   | 16 | CO4 | [K <sub>2</sub> ] |
| 16. | a) | Explain about Operating Characteristics (OC) curve with its types and specifications.  | 16 | CO5 | [K <sub>2</sub> ] |

\*\*\*\*\*