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Reg. No.

Question Paper Code

11650

B.E./B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

Fourth Semester

Mechanical Engineering

20MEPC402 - METROLOGY, MEASUREMENT AND COMPUTER AIDED

INSPECTION

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,
K-Level, CO</i> |
|--|-------------------------------|
| 1. Differentiate accuracy and uncertainty with example. | 2,K2,CO1 |
| 2. What are the factors affecting the measuring system? | 2,K2,CO1 |
| 3. List out any four angular measuring instruments used in metrology. | 2,K1,CO2 |
| 4. What are the construction requirements of good sine bar? | 2,K3,CO2 |
| 5. Name the various methods of measuring the minor diameter of the thread. | 2,K1,CO3 |
| 6. What are the advantages of pneumatic comparator? | 2,K2,CO3 |
| 7. Write some features of CMM software. | 2,K2,CO4 |
| 8. Name the common source of light used for interferometer. | 2,K1,CO4 |
| 9. Why is laser preferred in engineering metrology? | 2,K2,CO5 |
| 10. List any four possible causes of errors during sorting and counting. | 2,K1,CO5 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Define systematic error and explain the causes of those errors with appropriate examples. 13,K2,CO1
- OR**
- b) Describe the significance of linear measurements. In addition, explore the construction, working principle, and applications of any two linear measuring instruments. 13,K2,CO1
12. a) Determine the method that provides the best accuracy in measuring the angle of inclination in the part using the rollers, among the following methods.
- (i) Checking the angle of the taper plug gauge. 4,K2,CO2
- (ii) Measurement of inclined angle of an internal dovetail. 4,K2,CO2
- (iii) Measuring interior angle using of a profile gauge. 5,K2,CO2

OR

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

11650

- b) Describe how flatness can be checked on surface plates. Also, describe the working principle of the Tomlinson Surface finish tester using a neat sketch. 13,K2,CO2
13. a) With a neat diagram explain how gear tooth thickness is measured using a gear tooth vernier calliper. 13,K2,CO3
- OR**
- b) Describe the construction of a hydraulic dynamometer and explain how it is used for power measurement. 13,K2,CO3
14. a) Explain the procedure to be used in measuring various dimensions of a typical component using a cantilever type CMM. 13,K2,CO4
- OR**
- b) Describe the working principle of the NPL Flatness interferometer and how it works. 13,K2,CO4
15. a) A machine vision system recovers useful information about a scene from its two-dimensional digitized image. What are the stages in machine vision process? 13,K2,CO5
- OR**
- b) With an example, explain the impact of machine vision on industry automation. Also list some recent advancement in machine vision for industrial applications. 13,K2,CO5

PART - C (1 × 15 = 15 Marks)

16. a) Discuss how the accuracy of measurement is affected by the following:
(i) Poor contact between the workpiece and the measuring probe. 7,K3,CO6
(ii) Distortion of the work piece under gauge pressure. 8,K3,CO6
- OR**
- b) Outline the significance of measuring temperature. Also briefly explain the working of bimetallic strip type temperature measurement system. 15,K3,CO6