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**Question Paper Code : 80914**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Fifth Semester

Mechanical Engineering

ME 8501 — METROLOGY AND MEASUREMENTS

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between accuracy and precision.
2. Mention the sources of error and its remedial measures.
3. Mention at least four applications of a limit gauges.
4. Define the concept of interchangeability with suitable example.
5. What are the elements of machine vision system?
6. State the advantages of laser used in interferometers.
7. Distinguish between dedendum and a base circle in a spur gear tooth profile.
8. Figuratively represent the different elements of external screw threads.
9. Give the applications of bimetallic strips.
10. Discuss briefly about the problem faced in measuring temperature of a flowing fluid.

PART B — (5 × 13 = 65 marks)

11. (a) Illustrate the various factors affecting the accuracy of the measuring system with an appropriate industrial application.

Or

- (b) (i) Discuss the structure of generalized measurement system in detail with neat sketch. (10)
- (ii) Differentiate between systematic and random errors. (3)
12. (a) (i) Write short note on Taylor's principle of gauge design. (5)
- (ii) Discuss in detail about the method of tolerance specification of gauges. (8)

Or

- (b) Describe how an autocollimator works, and provide an overview of its main types. Explain the practical applications and advantages of each type. Provide labeled diagrams and relevant equations where applicable to support your explanation.
13. (a) List the various configurations of coordinate measuring machine. Explain the constructional features of any two configuration that are frequently used.

Or

- (b) Describe the working principle of a dual frequency AC laser interferometer with neat sketch.
14. (a) (i) List the various types of screw threads and also sketch the details of British Standard Whitworth (BSW) thread. (5)
- (ii) Describe the measurement of effective diameter of a screw thread by two wire method using floating carriage micrometer. (8)

Or

- (b) Discuss the working principle of Parkinson gear tester with a neat sketch and its usage to check the composite errors in spur gear.
15. (a) Demonstrate the application of any one type of force measurement device used in force measurement with appropriate definitions, principles and working methodology.

Or

- (b) (i) Describe with neat sketch, the construction and working principle of the pitot tube. (8)
- (ii) Discuss in detail about the need of calibration and reliability of temperature measuring instruments. (5)

PART C — (1 × 15 = 15 marks)

16. (a) Tailstock of the lathe is manufactured in the production shop. Discuss the various steps of inspection and list the measuring instruments required.

Or

- (b) List the devices used to measure flow rate. Compare the merits and demerits of all listed flow measuring devices. Suggest a suitable device along with valid reasons, to measure the flow rate of conductive fluid? If given an opportunity, design a device of your idea, and compare it with a device suggested earlier.
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