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**Question Paper Code : 41405**

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Fourth/Fifth Semester

Mechanical Engineering

**ME 6504 – METROLOGY AND MEASUREMENTS**

(Common to B.E. Materials Science and Engineering/Mechatronics Engineering)

(Regulations 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A

(10×2=20 Marks)

1. What are the factors affecting the measuring system ?
2. Distinguish between repeatability and reproducibility.
3. What are the construction requirements of a good sine bar ?
4. Define the term interchangeability.
5. Why monochromatic light is used in an interferometer instead of white light ?
6. List any four possible causes of error in CMM.
7. What is progressive error in screw thread ?
8. What is meant by back lash and run out in the spur gear ?
9. Distinguish between force and torque.
10. Name any four instruments used for measuring temperature.

41405

-2-



PART – B

(5×13=65 Marks)

11. a) Draw the block diagram of generalized measurement system and explain the different stages with examples. (13)

(OR)

- b) i) Explain the different types of errors involved in the measurement system. (7)  
ii) Discuss about the primary and secondary calibration of the measuring instruments. (6)

12. a) i) Explain with suitable sketches the measurement of straightness using autocollimator. (7)

- ii) Describe the GO and NOGO gauge design procedure with a sketch. (6)

(OR)

- b) i) Explain the construction and working principle of bevel protector with sketch. (7)

- ii) Why sine bar is not suitable to measure above  $45^\circ$ ? (6)

13. a) i) Explain the procedure of dimensional measurement using scanning laser gauge. (7)

- ii) What are the various types of CMM's, give details about anyone with a sketch? (6)

(OR)

- b) i) Discuss the working principle of the NPL Flatness interferometer. (7)

- ii) Illustrate the basic concept involved in the machine vision system. (6)

14. a) Briefly explain the step by step procedure for determining the flatness of a surface with the neat sketch. (13)

(OR)

- b) i) Explain the thread micrometer with a neat sketch. (7)

- ii) What are the various gear tooth measuring methods? Explain any one with simple sketch. (6)



15. a) i) With a sketch, explain the torque measurement using strain gauges. (6)  
ii) Describe the construction of a hydraulic dynamometer and explain how it is used for power measurement. (7)

(OR)

- b) With a neat sketch explain the velocity measurement using hot wire anemometer. (13)

PART – C

(1×15=15 Marks)

16. a) Measure the angle of inclination in the part using the rollers with the following method, among that identify which method produce the accuracy in the measurement.
- i) Measurement of angle using rollers.
  - ii) Checking the angle of taper plug gauges using rollers.
  - iii) Measuring of inclined angle of an internal dovetail.
  - iv) Measuring interior angle using of a profile gauge.
- b) Describe the following direct instrument measurements.
- i) Stylus probe type instrument.
  - ii) Tomlinson surface meter.