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**Question Paper Code : 41405**

11/05/18

(FN)

**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.



## 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.