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Question Paper Code : X20844

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
AND APRIL/MAY 2021

Fourth/Fifth Semester

Mechanical Engineering

ME 6504 – METROLOGY AND MEASUREMENTS

(Common to Material Science and Engineering, Mechatronics Engineering)

(Regulations 2013)

(Also Common to PTME 6504 – Metrology and Measurement for B.E. (Part-Time)

Fourth Semester – Mechanical Engineering Regulations – 2014)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A

(10×2=20 Marks)

1. What is the difference between repeatability and reproducibility ?
2. What is the difference between allowance and tolerance ?
3. List out any four angular measuring instruments used in metrology.
4. What are the advantages of pneumatic comparator ?
5. What is meant by “Qualifying the tip” in CMMs ?
6. Write any four applications of artificial vision systems in manufacturing industries.
7. Define drunken thread.
8. What are the various factors affecting surface roughness of a machined component ?
9. Write the working principle of hot wire Anemometer.
10. What is the working principle of thermocouple ?

**PART – B****(5×13=65 Marks)**

11. a) Explain the various errors in measurements. **(13)**
(OR)
b) What is the need of calibration ? Explain the classification of various standards. **(13)**
12. a) i) With a neat diagram explain the working of angle dekkor. **(10)**
ii) Why are sine bars not used for measuring large angles ? **(3)**
(OR)
b) Explain the construction, working principle and applications of Sine Bar.
13. a) Explain different types of CMM, in detail. **(13)**
(OR)
b) Explain the working principle of a AC laser interferometer with a neat diagram. **(13)**
14. a) Describe the construction of gear tooth vernier caliper. Explain how it can be used for measuring the tooth thickness. **(13)**
(OR)
b) Enlist and explain the different methods used for measuring the roundness. **(13)**
15. a) Discuss about any two types of measurement of temperature. **(13)**
(OR)
b) Explain the working of rotameter and orificemeter with neat sketches. **(13)**

PART – C**(1×15=15 Marks)**

16. a) Calculate the tolerances, fundamental deviations and limits of sizes for the shaft designated as 40 H 8/f7. Standard tolerance for IT 7 is 16i and IT 8 is 25i. Where 'i' is the standard tolerance unit. Upper deviation for 'f' shaft is $-5.5D^{0.41}$, 40 mm lies in the diameter range 30-50mm.
(OR)
b) Design general type GO and NO GO gauges for a 40H7/d8 fit. 40 mm lies in the diameter range 30 to 50. Show graphically the disposition of gauge tolerance zones relative to the work tolerance zones. Standard tolerance for IT7 is 16i and IT8 is 25i, where 'I' is the standard tolerance unit. The upper deviation for 'd' shaft is $-16D^{0.44}$
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