

190037

B.Voc. Automotive Mechatronics
Subject: Measurement and Metrology
Subject Code: BBME106
Semester: 2nd (Regular)
Batch: 2018-21
Theory (External): 35 Marks
Time: 03 hours

Instructions to the Students

1. This Question paper consists of two Sections. All sections are compulsory.
2. **Section A** comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries 1 mark.
3. **Section B** comprises 8 essay type questions out of which students need to do any 5. Each question carries 5 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labelled

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SECTION –A (OBJECTIVE TYPE QUESTIONS)

(10x1=10 Marks)

1. The difference between the lower and higher values that an instrument is able to measure is called _____
2. Define temperature. How is it different from heat?
3. What do you understand by random and systematic error?
4. What do you mean by accumulation of tolerances?
5. How many grades of tolerances does the ISO system of limits and fits specify?
6. Define unilateral and bilateral tolerances.
7. What is the need of instrument calibration?
8. What do you understand by GO and NOT GO gauges?
9. When do you prefer cast iron surface plates over granite surface plates?
10. How is a scale different from a rule?

SECTION –B (ESSAY TYPE QUESTIONS)

(5x5=25 Marks)

1. (a) Distinguish between direct and indirect measurements. Explain with example. (2.5)
(b) With an example, explain how end standards are derived from line standards. (2.5)

2. List the important considerations for the design of linear measurement instruments. (5)
3. The main scale in a vernier instrument is graduated in millimetres, with the smallest division being 1mm. Ten divisions on the vernier scale correspond to 11 divisions on the main scale. Answer the following questions:
 - a) Is the vernier scale a forward vernier or backward vernier?
 - b) What is the least count of the instrument?
 - c) If the main scale reads 12 mm and the 10th division on the vernier scale coincides with a division on the main scale, what is the value of the dimension being measured? (5)
4. With a neat sketch, explain the working of an infrared thermometer. In addition, state its application areas. (5)
5. A metric screw thread is being inspected using the two-wire method in order to measure its effective diameter and the following data is generated: Pitch = 1.25 mm, diameter of the best-size wire = 0.722 mm, and distance over the wires = 25.08 mm. Determine the effective diameter of the screw thread. (5)
6. Explain how a gear calliper enables an accurate measurement of chordal thickness of a spur gear. (5)

7. Explain the terms local interchangeability and universal interchangeability. State and explain Taylor's principle of gauge design. (5)
8. What is profilometer? Explain the factors affecting the surface roughness. (5)

****END OF PAPER****