Answer All Questions

Question One: (17 Marks)

a) Distinguish between line standard and end standard? Also State briefly the main uses of block gauges. (6 marks)

b) Define the following items: Scale Value &Scale division, Accuracy, Precision, Measuring Range, and Magnification. (6 marks)

c) c) State three different types of micrometer and verniar caliper. Showing how you check on its accuracy. (5marks)

Question Two: (18 Marks)

a) Using neat sketches draw a Vernier Caliper, and a Micrometer showing their main components, and the function of each component. (6 marks)

b) In measuring the diameter of the shaft, the axis of the *micrometer was not exactly normal to shaft's axis. The* micrometer reading was 23.65mm and the diameter of micrometer anvils were 8 mm. if the actual deviation of the micrometer axis from the normal direction to the shaft axis is estimated to be 5°, find the actual value of the shaft diameter. (6 marks)

c) What is the difference between a comparator and measuring instrument? Then list four advantages and four limitations of Mechanical comparators. (6 marks)

Question Three: (17 Marks)

a) Describe in detail how you would measure accurately the length of 78.35mm using slip gauge and dial indicator, and show how the magnification is achieved for dial indicator. (6 marks)

b) Sketch a Sigma Comparator and explain its working mechanism clearly indicating how magnification is achieved. (5 marks)

c) Explain the working principle of pneumatic comparator and Electrical comparator with neat sketch. (6 marks)

Question Four: (18 Marks)   (6 marks for each a, b, and c)

a) List out any four angular measuring instrument used in metrology and what is the main difference between linear and angular measurements.

b) Sketch two forms of sine bar in general use what are the important dimension of sine bar and what are precaution are necessary in its use, and if a sine bar (100mm) was used to measure the taper angle of the specimen and the gauge block was 5.055mm. What is the taper angle?

c) Balls of diameter 25 mm and 18 mm were used to measure a taper ring gauge the large ball protruded 8mm .above end face of the gauge and distance from this face to the top of the small ball was 32mm. calculate the angle of the taper and the large end diameter.

With My Best Wishes

Prof. Dr. Ibrahim Elewa