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BME-062

DIPLOMA IN MECHANICAL ENGINEERING (DME)

Term-End Examination

00253

June, 2018

BME-062 : METROLOGY AND INSTRUMENTATION

Time : 2 hours *Maximum Marks : 70*

Note : *Question no. 1 is* ***compulsory****. Attempt any* ***four*** *questions from questions no. 2 to 6. All questions carry equal marks. Use of scientific calculator is permitted.*

1. Choose the correct answer from the given four alternatives : *14×1=14*

   (a) Accuracy of measuring equipment is

   (i) the closeness with which a measurement can be read directly from a measuring instrument.

   (ii) a measure of how close the reading is to the true size.

   (iii) the difference between measured value and actual value.

   (iv) the smallest change in measurand that can be measured.

(b) Which of the following is the most important characteristic of a measuring instrument in general ?

(i) Precision

(ii) Accuracy

(iii) Repeatability

(iv) Sensitivity

(c) The accuracy depends upon

(i) precision of the instrument

(ii) precision of the method

(iii) good planning

(iv) All of the above

(d) Circular scale of the micrometer is marked on

(i) anvil

(ii) barrel

(iii) ratchet

(iv) thimble

(e) Precision of measuring equipment is

(i) the closeness with which a measurement can be read directly from a measuring instrument.

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(iii) the difference between measured value and actual value.

(iv) the smallest change in measurand that can be measured.

(f) Which of the following errors are inevitable in the measuring system and it would be vainful exercise to avoid them ?

(i) Systematic errors

(ii) Random errors

(iii) Calibration errors

(iv) Environmental errors

(g) Which of the following instruments is the most accurate ?

(i) Vertical caliper

(ii) Manometric screw gauge

(iii) Optical projector

(iv) Mechanical comparator

(h) A surface gauge is used for

(i) levelling the surface plate

(ii) checking the surface finish

(iii) laying out the work accurately

(iv) finding the depth of the surface

(i) A feeler gauge is used to check

(i) radius

(ii) screw pitch

(iii) surface roughness

(iv) thickness of clearance

(j) Element of the indicating device carrying the scale is called

(i) dial

(ii) housing

(iii) transducer

(iv) index

(k) External taper can be accurately measured with the help of

(i) sine bar and slip gauges

(ii) dividing head

(iii) precision balls and height gauge

(iv) combination set

(l) A sine bar is specified by

(i) its total length

(ii) the centre distance between the two rollers

(iii) the size of the rollers

(iv) the distance between rollers and upper surface

(m) Expressing a dimension as $25{\cdot}3^{\pm 0{\cdot}05}$ mm is the case of

(i) unilateral tolerance

(ii) bilateral tolerance

(iii) limiting dimensions

(iv) All of the above

(n) Bevel protractor is used for

(i) angular measurements

(ii) linear measurements

(iii) height measurements

(iv) flatness measurements

2. (a) Explain the following terms :

(i) Tolerance

(ii) Allowance

(iii) Basic size

(iv) Standard size

(v) Nominal size

(vi) Limits

(vii) Surface quality

(b) What is fit ? Name the three main types of fits with their uses and suitable sketches. 7+7

3. Sketch and describe the working principles and uses of the following : 7+7

(a) Outside micrometer, and

(b) Inside micrometer.

4. (a) What are the various applications of an optical projector ? List out the advantages of an optical projector.

(b) What is meant by calibration ? Which standards are generally used for calibration ? 7+7

5. (a) Discuss the applications of a toolmaker's microscope.

(b) Describe the advantages of CMM. 7+7

6. (a) What is a sine bar ? Explain how it measures angle.

(b) Describe the principle and working of an autocollimator. 7+7