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RN-8221

B. E. - II (Sem. IV) (Mechanical) Examination

May / June – 2010

Mechanical Measurement & Metrology

(As per GTU Syllabus)

Time : Hours] [Total Marks : **100**

Instruction :

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 2 (Sem. 4) (Mechanical)**

Name of the Subject :

☛ **Mechanical Measurement & Metrology**

☛ Subject Code No. : **8 2 2 1** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

SECTION – I

1 Attempt all questions : (any four) **20**

(1) State the different types of errors.

(2) Write short note on pneumatic comparator.

(3) Describe with neat sketch the principle of working of an auto collimator and state it's application.

(4) Describe stylus type instrument used for measuring surface roughness.

(5) Define - "Drift". Classify it.

(6) Explain - "Dynamic response".

2 (a) Attempt following questions : **15**

(1) Sketch and interpret the meaning of various interference fringe patterns observe using optical flat.

(2) Explain various methods of measuring surface finish.

(3) Short note on Angle Dekor.

OR

2 (a) Attempt following questions : **15**

(1) Sketch and explain the working principle of Johnson's micrometer.

(2) What are standards of measurements ? Explain classification of various standards.

(3) Explain alignment tests for milling machine.

3 (a) Explain following terms : **10**

(1) Metrology
(2) Precision
(3) Least count
(4) Pitch
(5) Roughness.

(b) Explain dial indicator with neat sketch. **5**

OR

3 (a) Explain following terms : **10**

(1) Accuracy
(2) Dirt error
(3) ISO system
(4) Roughness height
(5) Engineer's square.

(b) Explain bore gauge with neat sketch. **5**

SECTION – II

4 (a) Answer the following : **20**

(1) The measurand is
  (a) Measured variable
  (b) Output
  (c) Secondary signal

(2) The temperature measurement by a thermocouple is
  (a) Primary
  (b) Secondary
  (c) Tertiary measurement

(3) Dynamic quantities
  (a) Vary rapidly with time
  (b) Remain constant over a period of time
  (c) Are displaced from zero position

(4) The maximum probability has a large value for small values of
  (a) Standard deviation
  (b) Precision index
  (c) Uncertainty

(5) Systematic errors in a bourdon tube pressure gauge may be caused by
  (a) Friction in the pins and gears of the amplifying mechanism
  (b) Incorrect zero setting of the pointer
  (c) Variation of atmospheric pressure

(6) A potentiometer produces large variation in resistance by
  (a) Moving a slider across a resistor
  (b) Stretching a metal wire
  (c) Thermally expanding a conductor

(7) Piezometer is used for measuring
  (a) Gauge pressure
  (b) Vacuum
  (c) Absolute pressure

(8) Which of the following cannot be used for negative pressures
  (a) Piezometer
  (b) Pirani gauge
  (c) Bourdon gauge

(9) The hot wire anemometer is used to measure
  (a) Pressure in gases
  (b) Liquid discharges
  (c) Gas velocities

(10) Recording is not possible with
  (a) Liquid-in-glass thermometer
  (b) Thermocouples
  (c) Filled in system thermometers.

5 (a) Define : **6**
  (1) Atmospheric pressure (P_{at})
  (2) Absolute pressure (P_{abs})
  (3) Gauge pressure (P_g) and vacuum (P_{vac}).

(b) Explain - "Piezometer". **4**

(c) Derive the expression : **5**

$V = \sqrt{2gh_m}\sqrt{\frac{\rho m}{\rho}}$ for velocity of fluid for pitot static tube.

OR

5 (a) Explain : "Rotameter". **5**

(b) Write a short note on "Bi-metallic Thermometer". **5**

(c) Write a note - "Classification of measurement errors." **5**

6 (a) Explain - "Hydraulic mechanical load cell". **5**

(b) Explain with neat sketch - "Mechanical torsion meter". **5**

(c) Explain for screw thread : **5**

(1) Major diameter

(2) Minor diameter

(3) Effective or pitch diameter

(4) Angle of thread

(5) Helix angle.

OR

6 (a) Explain - "The klingeluberg involute gear tooth profile tester". **5**

(b) Write a note - "Bench micro-meter for external screw thread measurement". **5**

(c) What is the meaning of Metrology ? Define - Legal, Dynamic and Deterministic metrology. **5**