Total No. of Questions :5] *[Total No. of Printed Pages :3*

Roll No .....

ME - 503

B.E. V Semester

Examination, June 2015

Mechanical Measurement and Control

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each questions are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

1. a) Define the following terms:

   i) Calibration ii) Sensitivity

   iii) Range iv) Accuracy

   b) Compare direct and in-direct methods of measurement.

   c) Discuss phase linearity in measurement system.

   d) Explain about General measurement system along with neat sketch.

   OR

   Explain Zero order, First order, and Second order systems of measurement.

2. a) Draw and discuss normal distribution curve in measurement.

   b) Define:

      i) Mean value ii) Deviation

      iii) Variance iv) Standard deviation

   c) Discuss least squares regression analysis method.

   d) Explain the following errors with suitable examples:

      i) Gross error ii) Systematic error

      iii) Random errors

OR

A tachometer has been used to measure the speed of an hydraulic turbine model that is being run at 2000 rpm. The hydraulic turbine is subjected to variations in speed. For a sample of 30 readings at this speed how many readings would be in between 1980 and 2020 rpm. Assume a tachometer gives a normal set of readings with precision index 0.04 at 2000 rpm.

3. a) Discuss various temperature standards.

   b) Sketch pressure thermometer.

   c) Explain construction and working of thermocouples.

   d) Explain working principle of Rotameter with neat sketch.

OR

Discuss briefly following:

i) Resistance Temperature detector

ii) Orifice meter

4. a) Write about mechanical strain gauge.

   b) Explain Piezoelectric load cells.

   c) How measurement of torque on rotating shaft is done? Discuss.

   d) Explain the working principle of LVDT. State its practical applications.

OR

Name various transducers used for measurement of Force. Discuss with neat sketch working of hydraulic load cells.

5. a) Draw neat sketch of open loop and closed loop control systems.

   b) Define transfer function. State its applications.

   c) Discuss unit step and unit impulse response of first order systems.

   d) Explain about "Signal Flow Graphs" Define the various terms associated with it. State rules of simplify a given signal flow graph.

OR

What is a mathematical model? How modelling of Fluid systems can be done. Discuss briefly.

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