5. a) Draw a neat block diagram of control system.

   b) Define following terms:

      i) Transfer function

      ii) Impulse response function

   c) Briefly discuss modeling of mechanical systems.

   d) Explain modeling of thermal systems in detail.

OR

Explain the difference between following:

i) Open loop and closed loop control system.

ii) Positive and negative feedback.

iii) First order systems and second order systems.

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Roll No .....

ME - 503

B.E. V Semester

Examination, December 2014

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) Briefly classify the measuring instruments.

   b) Define calibration. State about static and dynamic calibration.

   c) How time constant is determined? State briefly.

   d) What is a measurement system? Discuss various elements of a general measurement system with neat sketch.

OR

Explain the following terms:

* Sensitivity
* Range
* Accuracy
* Precision
* Errors
* Sequential and random tests
* Noise and interference.

2. a) Define statics in measurement.

   b) Explain briefly uncertainty analysis in measurement.

   c) Define "error" in measurement. State its various types. State sources of errors.

   d) A force measuring instrument described by the following data:

   Resolution – 0.20 N

   Range – 0 – 100 N

   Linearity – within 0.2 N over range

   Repeatability – within 0.3 N over range

   Calculate:

   i) Uncertainty due to instrument.

   ii) Uncertainty due to design stage

OR

Explain least square regression analysis and data outlier detection.

3. a) State various temperature standards.

   b) Discuss Bimetallic thermometer with neat sketch.

   c) Write briefly about manometers.

   d) Discuss construction and working principle of orifice meter.

OR

Explain brief:

i) Thermistors

ii) Roto-meter

4. a) How power transmitted by a shaft can be estimated using torque and rotational speed?

   b) Explain liquid in glass thermometers.

   c) Differentiate between barometer and manometer. Also state their working range.

   d) Explain the working of pneumatic load cells with sketch.

OR

Draw neat sketch of following:

i) Moving coil transducer

ii) Potentiometer.