

Code No: 117EA

**R13****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech IV Year I Semester Examinations, November/December - 2016****INSTRUMENTATION AND CONTROL SYSTEMS****(Common to ME, AME)****Time: 3 Hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART- A****(25 Marks)**

1. a) Distinguish between Accuracy and Precision. [2]
- b) State and explain briefly desirable and undesirable dynamic characteristics. [3]
- c) List out active transducers. [2]
- d) State the characteristics of manometer fluid. [3]
- e) List out contactless electrical tachometers. [2]
- f) What is the relationship between the rotational speed and the flashing rate of stroboscope directed onto a single radial mark on the rotating wheel? [3]
- g) State the factors to be considered for the selection of material used in strain gauges. [2]
- h) Draw the neat diagram of Sling psychrometer and mention components. [3]
- i) State any two merits of closed loop control systems. [2]
- j) Distinguish between servomechanism and process control. [3]

**PART-B****(50 Marks)**

2. a) Draw the generalized scheme of a typical measurement system and explain about various components of it.
  - b) State and explain various types of errors in measurements. [5+5]
- OR**
3. a) Draw the block diagram of first order system. Derive the equation of transfer operator for the first order system.
  - b) Derive the steady-state responses of first order system with respect to:  
i) Step input and ii) Ramp input. [4+6]
4. Explain the construction and principle of LVDT with a neat diagram and compare it with capacity pickup transducer. [10]
- OR**
5. a) Explain the working principle of Bimetallic thermometer with a neat diagram.
  - b) A platinum resistance thermometer has a resistance of 140.5 and 100.0  $\Omega$  at 100 and 0°C respectively. If its resistance becomes 305.3  $\Omega$  when it is in contact with a hot gas, determine the temperature of the gas. Take the temperature coefficient of platinum as 0.0039°C<sup>-1</sup>. [5+5]

6. Explain with a neat sketch the functioning of displacer type liquid level measuring instrument. [10]

OR

7. Explain construction and the working principle of a Rotameter with a neat diagram. [10]

8.a) Define gauge factor. Explain the factors which affect the gauge factor.

b) Explain the method for measuring the bending strain using the resistance strain gauge with a neat sketch. [5+5]

OR

9.a) List out various types of electrical hygrometers for measuring the relative humidity. Explain atleast one in detail with a neat diagram.

b) What are the load cells? Explain the working principle of strain gauge load cell with a neat diagram. [5+5]

10.a) State advantages and limitations of open-loop control system.

b) Draw and explain block diagram for level control system. [5+5]

OR

11.a) Draw a block diagram of a typical closed loop system.

b) Draw and explain block diagram for speed control system.