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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal-500043, Hyderabad

**B.Tech VII SEMESTER END EXAMINATIONS (REGULAR) - FEBRUARY 2022**

Regulation: R18

**INSTRUMENTATION AND CONTROL SYSTEMS**

Time: 3 Hours

(ME)

Max Marks: 70

Answer FIVE Questions choosing ONE question from each module  
(NOTE: Provision is given to answer TWO questions from any ONE module)

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

## MODULE – I

- List main types of errors in instrumentation system with their source, effect and ways to reduce or eliminate these errors. Explain in brief. [7M]
  - The expected value of the voltage across a resistor is 90 V. However, the measurement gives a value of 89 V. Calculate:
    - Absolute error
    - Percentage error
    - Relative accuracy
    - Percentage of accuracy. [7M]
- Categorize the characteristics of instruments through which performance can be conveyed. [7M]
  - Explain how flow measuring instruments are calibrated by the primary and secondary calibration methods with suitable example. [7M]

## MODULE – II

- Explain how to measure the initial pressure using McLeod pressure gauge along with its working. [7M]
  - A McLeod gauge having  $V = 200 \text{ cm}^3$  and a capillary diameter of 2.0 mm is used to measure the gas pressure. What will be the pressure of the gas corresponding to a capillary of 4 mm? [7M]
- What are bellows gauges? Explain the bellows gauge used to measure gauge pressure. [7M]
  - How a thermistor is used for temperature measurement? Explain its applications, advantages and limitations. [7M]

## MODULE – III

- Explain the working of laser doppler anemometer (LDA) with its applications. [7M]
  - What is K factor in turbine flow meter? Explain each and every part of turbine flow meter along with neat sketch. [7M]
- Describe with neat sketch the working of variable induction accelerometer in engineering applications. [7M]
  - List out the importance of the speed measurement requirement in engineering. Explain with neat sketch the working of revolution counter and timer [7M]

## MODULE – IV

7. (a) Identify the importance of strain measurement. Explain how an unbounded strain gauge is used to measure strain. [7M]
- (b) Explain briefly the various bonded strain gauges. Give their classification considering engineering applications. [7M].
8. (a) What are dynamometers? Discuss briefly the working and advantages of fluid friction dynamometers. [7M]
- (b) Explain the purpose of providing backing for bonded strain gauges and temperature compensation with respect to strain gauges. [7M]

## MODULE – V

9. (a) What is a control system? Explain the various elements of control system in detail. [7M]
- (b) Explain the importance of control systems and briefly explain the advantages and disadvantages of pneumatic control systems. [7M]
10. (a) Explain the working of open loop system with the help of an example and block diagram. [7M]
- (b) List the requirements of a control system. Explain with block diagram any one speed control system. [7M]

