Code No: 155SC **RA**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, February - 2022
INSTRUMENTATION AND CONTROL SYSTEMS
(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

1.a) Explain the dynamic response characteristics of first-order instruments to step, ramp and sinusoidal inputs.
b) Describe the properties of materials used for piezoelectric transducers. Derive the expressions for voltage and charge sensitivities. [8+7]

2.a) Discuss briefly the generalized input-output configuration of a measurement system.
b) A voltage has a true value of 2.5V. An instrument with a scale range of 0-5V shows a voltage of 2.65V. What is the value of
i) Absolute error
ii) Correction
iii) % relative error with respect of true value.
iv) % Relative error concerning FSD. [7+8]

3.a) Platinum RTD has resistance at 0^0 C is 100Ω. If the temperature co-efficient of Platinum is 3 3.91×10^{-3} / ^{0}C, then find its resistance at 100^0 C.
b) With help of a neat diagram explain the working of the optical pyrometer. [5+10]

4.a) Explain the construction and working of the McLeod pressure gauge used for low-pressure measurement.
b) Explain how pressure is measured using bourdon tube and diaphragm with help of a neat diagram. [7+8]

5.a) With help of a neat diagram explain the principle and working of bubbler type level measurement.
b) Explain the construction and working principle of the A.C tachometer with a neat diagram. State its advantages and limitations. [8+7]

6.a) With the help of a neat diagram, explain the construction, working and special features of the Laser Doppler anemometer.
b) Explain the working principle of seismic instruments. With the help of suitable diagrams, explain the construction, working and application of vibrometer. [8+7]

7.a) Derive an equation of a gauge factor.
b) Give the classification of dynamometers. Explain how dynamometers can be used to measure the forces acting in different directions in a machine tool. [7+8]

8.a) What is a block diagram? Explain the steps involved in the preparation of block diagrams.
b) Explain the advantages and disadvantages of open and closed loop system. [7+8]

---ooOoo---