Code No: 154BC **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year II Semester Examinations, April/May - 2023
INSTRUMENTATION AND CONTROL SYSTEMS
(Mechanical Engineering)

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

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Define sensitivity, resolution, accuracy and dynamic error.	[2]
b)	What are systematic errors? Explain them in detail.	[3]
c)	State Seebeck effect, Peltier effect and Thomson effect.	[2]
d)	Explain the principle and working of McLeod vacuum gauge.	[3]
e)	What are microwave level sensors? What is their operating frequency?	[2]
f)	What is the principle of seismic instruments?	[3]
g)	What are strain gauge Rosettes? What are their applications?	[2]
h)	Write the principle and working of dynamometer.	[3]
i)	What is first order system?	[2]
j)	Define Transfer function. Write the TF of second order mechanical systems.	[3]

PART – B

(50 Marks)

2.a) Explain the classification of measuring instruments and compare their merits and demerits.
b) Explain the principle and working of Hall Effect and photoelectric transducers. [5+5]

OR

3.a) Discuss various types of errors in measurement systems and explain their methods of elimination/ minimization.
b) Explain with neat sketch the measurement of displacement using potentiometer and LVDT and derive the expression for its output. [5+5]

4.a) Explain the principle and working of Resistance thermometer with the help of measuring Circuits.
b) Explain the construction and working of dead weight tester pressure gauge. [5+5]

OR

5.a) Explain the principle, construction and working of total radiation pyrometers with sketches.
b) Explain the principle and working of hot and cold cathode Ionization gauges for vacuum measurement and mention their ranges of measurement. [5+5]

6.a) Explain with sketches the measurement of liquid level using bubble tube and displacer methods.

b) Explain the methods of measurement of speed by electric tachometers and tacho generators. [5+5]

OR

7.a) Describe with a neat sketch the principle and working of ultrasonic Doppler flow meter.

b) Explain the theory, principle and working of piezoelectric accelerometer with help of neat diagram. [5+5]

8.a) Derive the formula for gauge factor of metallic strain gauge. Describe methods of measurement of torque of a rotating shaft using strain gauges with neat diagrams.

b) Describe the methods of measurement of humidity using sling hygrometers and Dew point cell. [5+5]

OR

9.a) Explain the measurement of force and load using pneumatic, hydraulic and electric load cells.

b) Explain with neat sketches the working of torsion meters and dynamo meters. [5+5]

10.a) What is servomechanism? Describe the features and applications of a servomechanism?

b) What is a block diagram? Explain the steps involved to get transfer function from the block diagrams? [5+5]

OR

11.a) Differentiate between open loop control and closed loop control systems with suitable examples.

b) Draw a block diagram of a closed loop control system for motor speed control and explain its working. [5+5]

---ooOoo---