Total number of printed pages: 02 **Diploma (D)/4th Sem /DIE405**

2024

INSTRUMENTATION AND PROCESS CONTROL

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **all five** questions.*

1. a) Answer the following questions in brief- 10 X 2=20

i) What is a transducer?

ii) Name any two functions of Instruments and Measurement Systems.

iii) Name any two desirable characteristics of a Measurement system.

iv) Specify the input and output variables of Thermocouple.

v) Name any two devices/transducers with 'change in resistance' as the output variable.

vi) Name any two active transducers.

vii) The factors that affect the capacitance of a capacitor are-

viii) Lateral Strain is defined as-

ix) Name any two final control elements.

x) The S.I. units of measurement of Luminous intensity and Temperature are-

2. a) Draw the functional diagram of a Bourdon gauge and show the basic functional elements in it. 5

b) Briefly describe the following types of instruments- 3 X 3 = 9

i) Manual and Automatic types

ii) Self generating and Power operated types

iii) Contacting and Non-contacting types

c) Explain the importance of International Standard and Working Standard of measurements. 4

d) Name any two advantages of transducers with electrical output. 2

3. a) Explain the working of LVDT for measurement of displacement. 5

b) Differentiate between RTD and NTC-type thermistor. 4

c) Find the resistance of a Pt-100 RTD at 100 °C. Also, find its static sensitivity. (Temperature coefficient of resistance of Pt-100 is 0.00385). 5

d) What is a potentiometric resistance transducer? Explain how it can be used to measure pressure. 6

4. a) Define the following terms- 5

i) Accuracy ii) Linearity iii) Static Sensitivity iv) Speed of Response

v) Measuring Lag

b) With the help of suitable diagrams, explain the working of any two types of liquid level measurement device. 8

c) What is a strain gauge? Explain the measurement of resistance of strain gauge using Wheatstone bridge. 7

5. a) Draw the functional block diagram of an automatic process control system and state the function of each block. 10

b) What is an actuator? Name the four different types of actuators. 3

c) Differentiate between Open Loop and Closed Loop control systems. 2

d) Explain the working of a Dryer used in food industries. 5