Total number of printed pages = 3

19/4th Sem/DIE 405

2022

INSTRUMENTATION AND PROCESS CONTROL

Full Marks: 100

Time: Three hours

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

Answer any *five* questions.

1. (a) Explain the generalised functional characteristics of an instrumentation system with an example. 10

   (b) Describe the basic construction, working, type, characteristics of a RTD used for temperature measurement. 10

2. Answer the following questions :

   (a) What is Sensitivity ? 2

   (b) What is Reproducibility ? 2

   (c) What is Hysteresis ? 2

   (d) What is Accuracy ? 2

   (e) What is Precision ? 2

[Turn over

(f) Explain the construction, characteristics of thermocouple. Describe the principles of a thermocouple used for temperature measurement. 10

3. (a) Explain the functional structure of a feedback control system and feedforward control system. 10

(b) Explain the Control valve flow versus stem position characteristics, selection and sizing. 10

4. (a) Describe the functions of the following controllers. Write their advantages. Also, draw the characteristics in each case. 5×3=15

(i) Proportional Controller.

(ii) Proportional and Integral Controller.

(iii) Proportional and Derivative Controller.

(b) Write the full form of the following symbols used in P & ID : 5

TIC, PI, LX, FX, PIC, TS, LS, I/P, LI, AIC.

5. Write short notes on any *two* of the following : 10×2=20

(a) Ultrasonic level sensor.

(b) Capacitance type level sensor.

(c) Turbidity meter.

(d) Electromagnetic flowmeter.

6. (a) Explain the principles and workings of gas chromatograph. 10

(b) Explain the working of a pH sensor. 10

7. (a) Explain any two sensing elements for pressure measurement. 10

(b) Explain the working of loops 9, 10, 12 and 13 in the following figure : 10

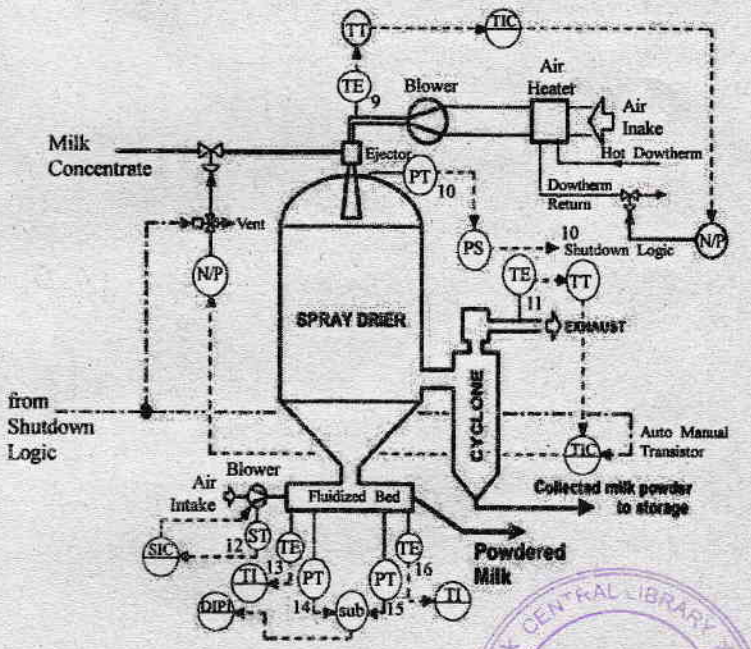

Figure-1