Total number of printed pages—4

53 (IE 812) INCP

2021

INSTRUMENTATION AND CONTROL IN PAPER INDUSTRY

Paper : IE 812

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1. *(a)* What are the different types of wood and their selection for paper manufacturing? 3

   (b) Explain with a neat diagram, the measurement and control of pH in the paper industry. 7

   (c) Explain the control and instrumentation for conductivity measurement at anion and cation columns in the paper industry. 10

Contd.

2. *(a)* Draw and explain the LOCAL/AUTO/ MANUAL modes of operation for a conveyor belt system used to transport wooden chips. 10

(b) Explain with a neat diagram, cascade control of *any two* loops for raw chip handling and pre-processing and DIGESTER of wooden chips. 10

3. *(a)* Explain with a neat diagram, the control loop for the TOP SEPARATOR of Digester-Compressed Air (padding) for Pressure Control using split range control. 10

(b) Explain the phenomena of HANG in Digester and as a maintenance engineer, how you will come to know through instrumentation the issue of hang and steps to remove the blockage of the flow of chips to the Blow Tank. 10

4. *(a)* Explain different types of sensors used for measurement of LEVEL application for liquid (*NaOH*) and wooden chips. 10

(b) Explain the term Integral Reset term in Proportional Integral Control. 5

(c) Explain the Bias term and Proportional Band with respect to wide and narrow band in Proportional control. 5

5. You are asked to automate your production process in the power plant. Prepare a case study stating the advantages of Data acquisition system, its functional aspects for the operation of plant. 20

6. For the Steam Boiler in your plant, discuss on the following control circuits with neat control loop diagram : 10+10=20

(i) Water/Steam Circuit

(ii) Fuel/Air Control Circuit.

7. (a) You are leading the group of operators in the control room. The operators are complaining various spurious, repeated alarms in the system. Prepare a case report on alarm management design procedure for your management. 10

(b) Determine the Reliability failure rate and MTBF for the following devices installed in a flow control loop whose failure rates are listed below : 10

The failure rates of various components :

— D/P flowmeter 1·73

— Digital controller 0·01

— I/P transducer 0·50

— Control Valve 0·50

— Valve Positioner 0·44