

(4)

6. Write short notes (*any two*)

5×2=10

- (a) On-Off controller
- (b) Rankine cycle
- (c) Economizer
- (d) Boiler draught
- (e) Water level indicator

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Ex/SC/INSC/PG/CORE/TH/MI301/2024

M. Sc INSTRUMENTATION EXAMINATION, 2024

(2nd Year, 1st Semester)

PROCESS CONTROL AND DCS (MI301)

PAPER : PG/CORE/TH/MI301

Time : Four Hours

Full Marks : 80

PART—I

*Answer **any four** questions, each question carries 10 Marks.*

1. (a) What are the basic components of Computer Based Measurement and Control System?

(b) Describe with diagram 5- level automation hierarchy of a computer integrated industrial manufacturing plant.
5+5=10
2. (a) Describe Automation Cycle through diagram.

(b) Show Input/Output Relation in a typical Liquid Level Controller with diagram .
4+6=10
3. (a) Describe Input/Output types of PLC.

(b) Why in some cases the Pulse type 1 input and output is required?

(2)

- (c) Discuss the merits and demerits of different type input/output modes in PLC. 3+3+4=10
4. In a proposed PLC based system, if a non-locking push button switch is pressed a conveyer motor starts and after 60 seconds it stops and wait for 15 seconds and the start rotating in the reverse direction, continues to rotate for next 60 seconds and stops, then wait for 15 seconds and the whole process continues unless another push switch is pressed or a overload and short circuit protection circuit actuates to make the motor stop at any stage. Draw the ladder diagram for the above control system with lamp indications for all the stages i.e. direct, waiting, reverse etc. 10
5. Draw a Block Diagram of DCS showing different subsystems. Also describe functions of all the individual modules. Compare a PLC based system with DCS. 7+3=10
6. (a) Show six popular topologies of Network.
(b) Draw Tree and Star type Wireless Inter Bus. 6+4=10

PART—II

Answer *any four* of the following

1. (a) What do you mean by process variable?
(b) Define manipulated variable and controlled variable.
(c) With a neat diagram, describe the different elements of a process control system. 2+2+6=10

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[Continued]

(3)

2. (a) Explain with suitable diagrams, the feedback and feedforward control system scheme.
(b) Define degree of Freedom for a process control system.
(c) Derive a mathematical expression to explain the dynamic behavior of a liquid level system. 3+2+5=10
3. (a) What is Hydraulic controller?
(b) What are the components of Hydraulic Control system?
(c) Explain hydraulic PI controller with suitable diagram. 1+3+6=10
4. (a) With a schematic diagram, explain a pneumatic flapper nozzle unit.
(b) Explain pneumatic PID controller with suitable diagram. 3+7=10
5. (a) What is turbine? What are the different types of water turbine?
(b) Explain with schematic diagram the working principle of an impulse turbine.
(c) Discuss various types of wind turbine and their application. 2+6+2=10

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[Turn Over]