315352

12526
3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answer with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) State the importance of Process Control in process industries.

b) Define Unit Operation and give two examples.

c) Define hazardous area.

d) Define intrinsic safety.

e) Define Distributed Control System (DCS).

f) State the term Redundancy in DCS.

g) List any four types of DCS work stations.

P.T.O.

Marks

2. Attempt any THREE of the following: **12**

a) Differentiate between feedback and feed-forward control with a simple example for each.

b) Explain the working principle of a shell and tube heat exchanger with a neat sketch.

c) Explain the evolution of DCS and compare it with PLC.

d) Discuss a typical troubleshooting procedure for a DCS.

3. Attempt any THREE of the following: **12**

a) Draw a complete process control loop using ISA 5.1 symbols, showing a sensor, transmitter, controller, and final control element.

b) Describe any four safety interlocks employed in a boiler for safe operation.

c) List any four commonly referred IP Ratings and state their applications.

d) Explain the function of a controller module and a power supply module in DCS.

4. Attempt any THREE of the following: **12**

a) Describe cascade control with either block diagram or typical P & ID and state its relevant industrial applications.

b) Describe the operation of a boiler, mentioning the key components.

c) Explain the classification of hazardous areas according to NEC standard.

d) Describe the architecture and key features of the DeltaV DCS.

e) Explain the use of timer and counter function blocks in FBD programming with an example.

Marks

5. Attempt any TWO of the following: **12**

a) Draw and explain single element, two element and three element drum level control schemes for boiler.

b) Design a control scheme using feedback and cascade control for a heat exchanger to maintain the outlet temperature of the process fluid. Justify the use of each control strategy.

c) Discuss the role of local and remote I/O modules in Distributed Control System (DCS).

6. Attempt any TWO of the following: **12**

a) Explain in detail the following methods of protection used in hazardous areas:

i) Intrinsic safety with a Zener barrier.

ii) Oil immersion, and

iii) Purging.

b) Draw and explain the architecture of Distributed Control System (DCS) in detail, including its different levels of control.

c) Explain the basics of Function Block Diagram (FBD) programming. Develop a simple FBD program for a level control application using standard logical, timer, and comparison blocks.
