

17663

11920

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers 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. (A) Attempt any THREE : 3 × 4 = 12

- (a) Draw the block diagram of process control system and state function of each block.
- (b) Describe the working of ratio control system.
- (c) List the features of typical DCS.
- (d) Draw and explain feed forward control scheme in distillation column.

(B) Attempt any ONE : 6

- (a) Draw P & I diagram for one element, two element boiler control. Describe any four safety interlocks for boilers.
- (b) Explain the concept of “unit operation”. Describe the working of drying process with neat diagram.

2. Attempt any TWO :**2 × 8 = 16**

- (a) Define valve positioner. Draw the neat diagram of electro-pneumatic valve positioner. Write its working.
- (b) Draw a neat labelled diagram of shell and tube heat exchanger. Explain the concept of co-current heat exchanger.
- (c) Draw the architecture of DCS. List the different communication methods in DCS. Explain Ethernet.

3. Attempt any FOUR :**4 × 4 = 16**

- (a) Draw and explain feed forward control loop for single effect evaporator.
- (b) Describe working of Ball valve with diagram.
- (c) Draw the diagram of selective control with example. Describe its working.
- (d) Draw different interconnection of P and ID symbols.
- (e) State the functionality of Modbus and Profibus in DCS.

4. (A) Attempt any THREE :**3 × 4 = 12**

- (a) Differentiate between single seated and double seated globe valve.
- (b) Draw P & ID symbol for
 - (i) Rotameter
 - (ii) Temperature transmitter
 - (iii) Venturimeter
 - (iv) Ball valve
- (c) Draw feed forward control scheme for drum level of boiler and explain in brief.
- (d) State the need of instrument index sheet and process flow sheet.

(B) Attempt any ONE :**6**

- (a) Define cavitation and flashing. Explain phenomena flashing occurs in control valve. State the remedies to overcome it.
- (b) Draw the block diagram of DCS in thermal industry and describe its working.

5. Attempt any TWO :**2 × 8 = 16**

- (a) (i) Draw the block diagram of Adaptive Control System and describe its working.
- (ii) Draw control valve flow characteristics. Give the meaning of one of them.
- (b) Enlist the document required for instrumentation in project engineering. State the role of instrumentation engineering in control project engineering.
- (c) Enlist the advantages of DCS. Draw schematic diagram of DCS in Cement Industry.

6. Attempt any FOUR :**4 × 4 = 16**

- (a) List different process display. State the function of any two display.
 - (b) State the principle of control valve and explain its construction.
 - (c) Draw the block diagram of batch process and describe process with example.
 - (d) Compare human aided control system with automatic control system. (four points)
 - (e) Find the value of Cv for a valve that must allow 400 gallons per minute of ethyl alcohol with a specific gravity of 1.2 at minimum pressure of 65 psi. Estimate the required valve size.
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