

# 22644

**22223**

**3 Hours / 70 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) 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) Explain working principle of spray dryer. (in short)
  - b) Compare human aided control and automatic control. (two points)
  - c) State the need of valve positioner.
  - d) Draw a block diagram of cascade control strategy.
  - e) Explain the concept of selective control strategy.
  - f) Explain drying curve.
  - g) Draw a neat diagram of boiler equipment.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Draw the P and ID symbols for
    - i) Orifice Plate
    - ii) Pressure controller
    - iii) Solenoid actuator
    - iv) Control valve with electropneumatic positioner.
  - b) Describe with sketch the control valve flow characteristics.
  - c) Explain split range control strategy with example.
  - d) State the following project engineering terms
    - i) process flow sheet
    - ii) Instrument index sheet
- 3. Attempt any THREE of the following:** **12**
- a) Explain with a neat diagram the working of electropneumatic force balance valve positioner.
  - b) Explain with a neat block diagram the adaptive control strategy.
  - c) Describe with a neat diagram the operation of shell and tube heat exchanger.
  - d) State the selection criteria of DCS system.
- 4. Attempt any THREE of the following:** **12**
- a) Explain with a neat block diagram the function of each element of process control system.
  - b) Compare ball valve and globe valve.
  - c) Describe with a neat block diagram the feed forward control strategy.
  - d) Explain safety interlocks of boiler.
  - e) Differentiate between modbus and profibus.

- 5. Attempt any TWO of the following:** **12**
- a) Explain with sketches the control valve noise and give remedies to reduce it.
  - b) Compare feedback and feedforward control strategy (6 points)
  - c) Draw the architecture of DCS system. State function of all components in it.
- 6. Attempt any TWO of the following:** **12**
- a) State application of ratio control and override control strategy.
  - b) Draw multieffect evaporator controls as given below
    - i) Use cascade control strategy to control density of product.
    - ii) Use feedback control strategy to control liquid level in evaporator.
  - c) Draw distillation controls as given below:
    - i) Use cascade control strategy to control liquid level in column.
    - ii) Use feedback control strategy to control column pressure.
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