



# 17663

11819

**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**.*

**Marks**

1. A) Attempt **any three** of the following : **12**
  - a) Distinguish between human-aided control and automatic control with neat diagrams.
  - b) Explain with neat diagrams the working of ratio control.
  - c) List the advantages of DCS.
  - d) Illustrate the use of feedforward control scheme for steam pressure control in boiler.
  
- B) Attempt **any one** of the following : **6**
  - a) Illustrate P and I diagram for two-element and three-element feedwater control system in boiler.
  - b) State the principle of evaporator. Explain single-effect and multiple-effect evaporator with neat diagrams in brief.
  
2. Attempt **any two** of the following : **16**
  - a) List the types of valve positioners. Explain with neat diagram the working of motion balance positioner.
  - b) Explain the principle of drying process with neat typical drying curve and drying rate curves. Illustrate the use of cascade control scheme to control the temperature in dryer.
  - c) Describe the architecture of DCS. Illustrate the application of DCS in thermal power industry.

**P.T.O.**



3. Attempt **any four** of the following : 16
- a) Discriminate the effect of feedback and cascade control schemes on steam heater type heat exchanger.
  - b) Explain with a neat diagram the control valve characteristics.
  - c) Compare feedforward and feedback control system.
  - d) Calculate proper Cv and required valve size for a valve that must allow 360 gal./min. of benzen with a specific gravity of 0.88 at  $\Delta p$  of 50 psi.
  - e) List various DCS communication methods. Explain ethernet.
4. A) Attempt **any three** of the following : 12
- a) Draw a neat block diagram of process control system. Explain its elements.
  - b) Explain with a neat diagram the construction and working of single-seated globe valve.
  - c) State the working principle of distillation column. Illustrate the use of feedback control scheme to control pressure in distillation column.
  - d) Explain instrument index sheet.
- B) Attempt **any one** of the following : 6
- a) Explain with neat diagram the cavitation and flashing in control valve.
  - b) Explain with neat diagram the profibus communication in DCS system.
5. Attempt **any two** of the following : 16
- a) Explain with neat diagram the working of selective control. State the necessity of valve positioner.
  - b) List the documents required for instrumentation in project engineering. Outline the significance of P and I diagram.
  - c) Explain with neat diagram the DCS group display. State selection criteria of DCS system.
6. Attempt **any four** of the following : 16
- a) Describe with a neat diagram trend display in DCS system.
  - b) Outline the factors to be consider for selection of control valve.



- c) Compare counter-current and co-current heat exchangers.
- d) Draw P and ID symbols for :
  - i) Process line
  - ii) Pressure transmitter
  - iii) Control valve with pneumatic positioner
  - iv) Heat exchanger.
- e) Identify the elements of temperature control system given in Figure 1.

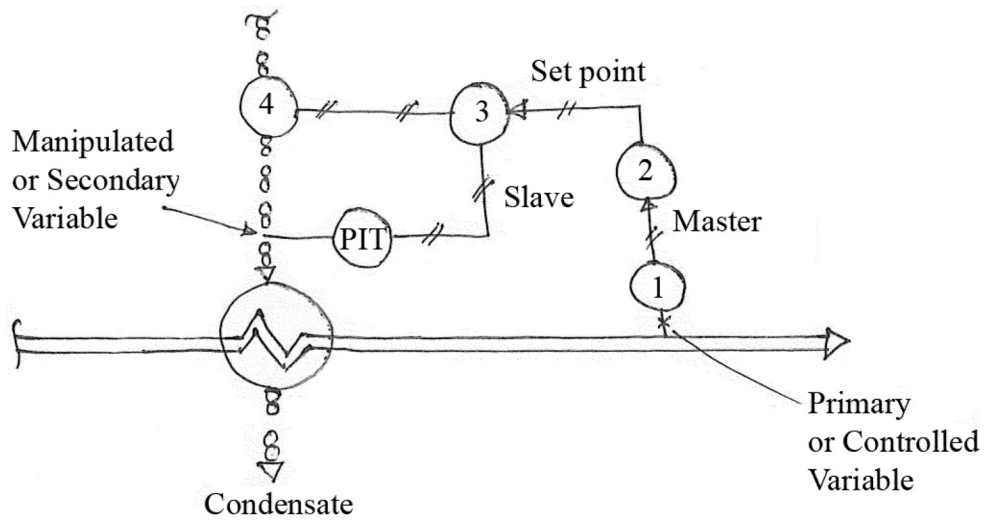


Figure 1