# 17663

**21415**

**3 Hours / 100 Marks** **Seat No.** | | | | | | | | |

***Instructions*** : (1) All Questions are *compulsory*.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

**Marks**

**1. (A) Attempt any THREE of the following :** **12**

(a) Explain feed forward control system with suitable diagram.

(b) List the features of Ethernet TCP/IP.

(c) Draw the block diagram of process control system. State function of any two blocks.

(d) Differentiate between single seated and double seated globe valve.

**(B) Attempt any ONE of the following :** **6**

(a) Draw and explain a typical distillation column.

(b) Find the proper valve size in inches and centimeter for pumping the liquid flow-rate of 600 gal/min with maximum pressure difference of 55 psi, liquid specific gravity is 1.3. Find valve size.

**2. Attempt any TWO of the following :** **16**

(a) Enlist different process displays. State the function of any two displays. Draw the schematic diagram of DCS in cement industry. Write the steps to control process operation in cement industry.

(b) Enlist the documents required for instrumentation in project engineering. State role of instrumentation engineer in project engineering.

(c) Define valve positioner. Draw the neat diagram of electro-pneumatic valve positioner. Write its working.

**3. Attempt any FOUR of the following :** **16**

(a) Describe in brief feedback control scheme for heat exchanger with neat diagram.

(b) State the need of instrument index sheet.

**P.T.O.**

(c) Draw and explain the cascade control scheme for any two variables in distillation column.

(d) Describe in brief ratio control system.

(e) Name the different DCS communication methods. Describe any one.

**4. (A) Attempt any THREE of the following :** **12**

(a) Describe the working of solenoid control valve with neat diagram.

(b) State the need of valve positioner. Name its types.

(c) State and explain selection criteria for DCS system (any four points)

(d) Explain how the feed water level is controlled in boiler.

**(B) Attempt any ONE of the following :** **6**

(a) Describe different remedies to avoid problem of cavitation and flashing in control valve.

(b) Discriminate human aided and automatic process control (any six points).

**5. Attempt any TWO of the following :** **16**

(a) Draw physical diagram and P and I diagram for single element and double element boiler process.

(b) Draw the architecture of DCS system. State functions of all components in it.

(c) Draw a neat labelled diagram of shell and tube heat exchanger. Explain the concept of co-current heat exchanger.

**6. Attempt any FOUR of the following :** **16**

(a) Draw P and ID symbol for

(i) Temperature transmitter

(ii) Rotameter

(iii) Orifice meter

(iv) Venturimeter

(b) Draw control valve characteristics. Define (i) Rangeabilty (i) $C_V$.

(c) State the principle of evaporator. Draw feed forward control system for single effect evaporator.

(d) What is Cascade Control ? Explain the “Master” and “Slave” with respect to Cascade Control.

(e) State the functionability of Modbus and profibus in DCS.

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