17540

15116

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

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 four**: **16**

a) Explain the elements of a process control system. **4**

b) Compare electronic and pneumatic transmission for any four points. **4**

c) Draw and explain current to voltage converter. **4**

d) State the difference between strip chart and X-Y recorders. **4**

e) Define intrinsic safety. How can it be achieved ? **4**

2. Attempt **any four**: **16**

a) Draw and explain temperature control loop for a tank containing liquid to be heated by steam. **4**

b) Describe HART communication system with relevant diagrams. **4**

c) Explain the purpose of using signal converters in process industries with an appropriate example. **4**

d) State the advantages of graphic panels. **4**

e) Draw a neat diagram of potentiometric type recorder and label the parts. **4**

3. A) Attempt **any three**: **12**

a) Define the term process control system. Define the terms controlled variable and controlling variable. **4**

b) Draw a neat diagram of flapper nozzle amplifier. Describe its working. **4**

c) Draw the block diagram of data logger. State the functions of each block. **4**

d) Classify the hazardous area for the following : **4**

i) Aluminium dust ii) Hydrogen

iii) Hard coal Kentucky bituminous iv) Wheat.

P.T.O.

Marks

B) Attempt **any one** : **6**

a) Draw and explain P/I converter. **6**

b) Explain the ergonomic considerations of designing a control room. **6**

4. A) Attempt **any three** : **12**

a) Name the characteristics of a process that need to be considered while designing a control system. Define any of the two terms. **4**

b) Give the classification of control panel. Explain break front panel. **4**

c) Explain the following terms w.r. to DAS : **4**

i) Ratiometric conversion

ii) Logarithmic conversion.

d) Draw and explain Redding Zener barrier circuit. **4**

B) Attempt **any one** : **6**

a) Draw a neat block diagram of SMART transmitter. Explain each functional block. **6**

b) Draw and explain voltage to current converter. State its working principle. **6**

5. Attempt **any two** : **16**

a) Define calibration with a neat diagram explain the procedure of calibration of a DP transmitter at the bench. Draw the five point calibration graph. **8**

b) i) Draw the block diagram of a single channel data acquisition system. **4**

ii) A data logger is monitoring 10 analog loops. A computer requires 4 μs per instruction and 80 instructions to address a multiplexer line and to read in and process the data in that line. The ADC does the conversion in 25 μ s. If the multiplexer requires 15 μs to select and capture the input line, determine the maximum sampling rate of a particular line. **4**

c) Give the IEC classification of the industrial area of process industries. **8**

6. Attempt **any two** : **16**

a) Draw a neat labelled diagram of force balance type electronic transmitter. Explain its working. **8**

b) Define IP classification of enclosures. Explain the meaning of following codes. **4**

i) IP 54 ii) IP 34

iii) IP X4 iv) IP 65. **4**

c) i) What is an alarm annunciator ? **2**

ii) Explain the terms used in specifying an alarm annunciator system. **6**