17540

11819

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****.*

Marks

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

a) State the importance of process control systems in process industries. Also define
   i) Controlled variable
   ii) Manipulated variable
   iii) Disturbance variables and
   iv) Set-point involved in a typical process control loop.

b) State the need of signal transmission system and list the different types of signal transmission methods.

c) Draw the neat labelled diagram of current (I) to pressure (P) converter. State its application in process instrumentation.

d) State the need of DAS and list its any four applications.

B) Attempt **any one** of the following : **6**

a) Draw and explain the construction and operation of pressure (P) to current (I) converter/transmitter. Give its two industrial applications.

b) State the need of recorders. With the help of neat block diagram, explain the working of strip chart recorder.

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

a) What is the need of calibration of instruments ? Explain techniques for calibrating one temperature transmitter.

b) Draw the control room layout. Discuss any six ergonomic considerations for designing control room.

c) Explain the meaning of Hazardous area. Give the classification of Hazardous area according to the materials (NEC standard).

Marks

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

a) List the different process characteristics (any four). Explain with neat diagram any one of them.

b) Explain in brief IP classification for enclosures.

c) Draw the block diagram of data logger. Explain its operation.

d) Draw the block diagram of single channel DAS and explain in brief its working.

e) Draw the intrinsic safety barrier circuit and explain its working.

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

a) Draw and explain the operation of flapper-nozzle mechanism.

b) Draw and explain the operation of voltage to current converter. Explain its use in signal conversion and/or transmission.

c) Interpret the NEMA ratings

i) NEMA 12 ii) NEMA 67.

d) Explain how explosion proofing is used to protect instruments in hazardous area.

B) Attempt **any one** of the following : **6**

a) What is foundation field bus ? Draw and explain an architecture of foundation field bus.

b) Draw the block diagram of multichannel DAS and explain its working. Also state its applications (any two).

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

a) Draw the block diagram of SMART transmitter. Explain it salient features (any four).

b) List the different types of control panels. Draw and explain any two panels in detail.

c) List the different types of alarm annunciators. Draw the schematic diagram of a typical alarm annunciator. Describe its operational sequence.

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

a) Draw a neat block diagram of process control system. Explain the role of each block.

b) Draw the feedback control systems for liquid level control and identify its elements.

c) What is HART communication protocol ? Draw its block diagram and state its importance.

d) Draw and explain the working of current (I) to voltage (V) converter.

e) Compare DAS and Data logger (any four points).

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