B.E. Instrumentation Engineering Seven Semester

# IN702 - Advanced Process Instrumentation

P. Pages : 2 **GUG/W/18/1826**

Time : Three Hours

* 1 4 2 5 *

Max. Marks : 80

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Notes :
1. Same answer book must be used for each question.
2. All questions carry marks as indicated.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.

**1.** a) Illustrate the concept of data acquisition system with suitable sketch. **8**

b) Discuss in detail the functions of direct digital control (DDC). **8**

**OR**

**2.** a) Discuss in brief the SCADA system with neat sketch and example. **8**

b) Draw and discuss functional block diagram of a computer control system. **8**

**3.** a) Design the architecture of HART communication protocol with suitable example. **8**

b) Elaborate the functions and architecture of foundation fieldbus. **8**

**OR**

**4.** a) Differentiate between enterprise network and control network. **8**

b) Discuss the communication hierarchical model used in industries. **8**

**5.** a) Elaborate the role of IEC 61511 standard in process safety. **8**

b) Discuss safety integrity level (SIL) in brief. **8**

**OR**

**6.** a) Discuss the safety instrumented system (SIS) in detail. **8**

b) Draw and discuss the safety life cycle with suitable diagram. **8**

**7.** a) Elaborate SLPC and its applications in detail. **8**

b) Discuss and analyse following control loops. **8**
1) Temperature control loop. 2) Level control loop.

**OR**

**8.** a) Elaborate the functions of PID controller. Also discuss how PID gains are tuned? **8**

b) Discuss in detail the flow control and also derive an expression to obtain time constant $(\tau)$. **8**

**9.** a) Draw and discuss the process flow diagram for heat exchanger pilot plant. **8**

b) Discuss in detail the feedback and feedforward control strategies used in distillation column process. **8**

**OR**

**10.** a) Discuss the design aspects of boiler pilot plant. **8**

b) Elaborate the temperature control system using a three way valve in a liquid to liquid heat exchanger. **8**

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