# Sem VIII - INST, Batch Process Automation.

# Q.P. Code: 8097

(3 Hours)

1 is communication

BT.

[Total Marks : 100

-		<ol> <li>(2) Attempt any four questions from remaining six.</li> <li>(3) Assume suitable data.</li> </ol>	
L	(a) (b) (c)	List benefits and need of ISA S88 standard. Define batch, recipe and batch process based on ISA standard. What are the different types of manufacturing processes? Give relevant examples for each	5 5 5
	(d)	Explain set point programmer.	5
-	(a) (b)	Explain what are VFDs and one of its applications. With a neat diagram explain process model of ISA S88 of Batch Process.	10 10
-	(a) (b)	With a neat diagram explain Control Activity Model. Explain Production Information Management in detail.	10 10
4	(a) (b)	What is recipe? Explain contents of a recipe and different types of recipe. With a neat diagram explain Physical Model of ISA S88 batch process. Give suitable example.	10 10
5	(a)	Explain in detail what is Allocation and Arbitration regarding resources	10
	<b>(b)</b>	What are the different types of reports generated in batch process? Elaborate each.	10
2	(1)	What is GAMP? Explain the guidelines provided in GAMP for food and pharmaceutical Industry.	10
	(5)	What are the methods by which solid and liquid raw materials are charged in a batch process. Elaborate.	10
-	Wri	<ul> <li>(a) MES - ERP Integration</li> <li>(b) Temperature control for reactors in Batch Proces (any two)</li> <li>(c) Procedure for executing a batch using Batch Management Software.</li> </ul>	20

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BE Sem VIII (R) Instrumentation Project Documentation & Execution /

INST.

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	QP Code :	8029
	(03 Hours) [Mark	rs- 100]
Note-		N.
1.	Question No. 1 is Compulsory.	$\langle \mathbf{C} \rangle$
2	Solve any Four questions out of remaining six questions.	
3.	Assume suitable data if required.	XXX
4.	Draw neat diagram wherever required.	
	,O*	
Que 1.	Answer the following (Any Four)	(20)
	a) Define project and explain term predictability related to project.	
	b) Explain Conduit and tray schedule.	
	c) Explain Sequential Function Chart (SFC) with example.	
	d) Explain the role of designer.	
	e) Explain ISA tagging process to indicate the instrument and its function.	
Que 2.	a) Explain Project planning in details.	(10)
	b) Draw and explain electronic and pneumatic loop wiring diagram for level control loo	p. (10)
~ ~	a) Evaluin the following	(10)
dan's	i) Inaction how schedule ii) Air header schedule	(10)
	b) Explain Eactory Accentance Test and Site Accentance test	(10)
	b) Explain Factory Acceptance Test and She Acceptance test.	(10)
Core 4	a) Draw and explain book up diagram for flow and temperature measurement.	(10)
	b) Explain in short HMI specification.	(10)
One 5	a) Explain the specification sheet for DP transmitter and control valve.	(10)
	b) Describe the different Standards used for instrumentation project.	(10)
	Section of the sectio	
Que 6	Draw and explain the Instrument location plans with example.	(10)
	b) Explain the following project activity-	(10)
	i) O & M manual ( ii) Commissioning	
Que 7	Write a short note on any Two	(20)
	a) Project Deliverables	
	b) Checkout procedure for Temperature transmitter and control valve	
	c) Software packages for Documentation.	

RJ-Con. : 8955-15.

BE-Sem-VIII - (Rev) - INST - Instrument & System Design

### Q.P. Code : 8312

129-5

[Total Marks : 100 (3 Hours) N. B. (1) Question No. 1 is compulsory. (2) Answer any four out of remaining six questions. (3) Assumptions made should be clearly stated. Q. No. Marks 20 Q.1 Explain any Four a) Safety Valve and Rupture disc b) Pressure Recovery Factor c) Piping geometry factor d) Control valve co-efficient and co-efficient of discharge e) Calibration technique of thermocouple a) Size the control valve for following data 0.2 10 Fluid = Benzene Flow = 450 GPM D = 6 " schedule 40  $P_1 = 80 \text{ psia}, P_2 = 71 \text{ psia}, C_d = 25.$  $T = 52^{\circ}R, G = 0.88$ b) Explain IP classification for control panel 10 a) The following conditions are given with requirement that sound pressure 0.3 10 level be below 87dbA Q= 295000 scfh, molecular weight = 26.1  $P_1 = 60.5 \text{ psia}, P_2 = 30.25 \text{ psia}, \text{Temperature} = 565^{\circ}\text{R}, k = 1.41$ Pipe Diameter = 6"SCH 40, valve 4" high performance butterfly valve at following conditions FpCv = 199, Fp = 1,  $X_{TP} = 0.37 = X_T$ b) Explain the effects of Flashing and remedies to avoid it 10 Q.4 a) A 30% cutterfly valve is to be operated under following conditions Fluid water, flow rate = 25000 GPM  $P_1$  = 65 psia  $P_2$  = 49 psia  $F_{V} = 0.6$  psia, Inside diameter = 29.25". What is the extent of cavitation? 10 b) Explain the effects of Cavitation and remedies to avoid it. 10

**TURN OVER** 

RJ-Con. 11449-15.

#### Q.P. Code : 8312

10

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Q.5 a) Design a control valve for following application-Steam and Water flow at 280°F, Moisture fraction 5 percent, Flow rate W= 1600 lb/hr P<sub>1</sub>= 29.8 psia, P<sub>2</sub>= 19.7 psia, D= 3"SCH 40 Vf = 0.01700 feet<sup>3</sup>/lb Vg= 13.841 feet<sup>3</sup>/lb, K= 1.32, Cd = 12.5, F<sub>L</sub> = 0.86, X<sub>T</sub> = 0.62 10
b) Explain any two types of control panel in detail
Q.6 a) Packing and enclosure design guidelines.
b) Explain choked flow condition and compressibility factor

for Gas flow condition.

- Q. 7 write a short note on (ANY TWO)
  - a) Grounding and shielding of an electronic product
  - b) Explain control room layout and its environment
  - c) Ergonomics

RJ-Con. 11449-15.

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E- Sem- VIII- Rev- INST - Nuclear Instrumentabol

# Q.P. Code : 8158

#### [Total Marks: 100 (3 Hours) Question No. 1 is compulsory. **B.**: (1) Attempt any Four from remaining Six questions. (2)Assume suitable data if required and justify same. (3)(a) What are the different units of Radioactivity? Explain 5 5 (b) Explain pair production process. 5 With respect to PMT explain "dark current". (c) 5 (d) Explain Photo-electric effect. Explain the need of quenching in G.M. Counter. Discuss all methods used for (a) 10 quenching. Explain Ge-Li and Si-Li detector with neat diagrams. List the advantages of 10 (b) Semiconductor detectors. What is Gamma Camera? Explain its block diagram and operation. Explain how it can be 20 used in medical applications. Explain the term Thyroid uptake studies. Explain how it is carried out. What is 10 100 (a) hypo and hyper thyroid? Explain the integral and differential pulse height spectra. 10 (b) Explain the Factors affecting resolution of spectroscopy system used for nuclear **=** (a) 10 experiments. Explain application of nuclear instrumentation for thickness detection. (b) 10 5 Define scintillation process. What are the types of scintillators. List the properties (a) 10. of good scintiliators. Explain the different types of discriminators and their functions. 10 (b) Explain different working regions of gas filled detectors. 10 (a) Explain applications of nuclear instruments in agriculture and food industries. (b) 10

RJ-Con. 10503-15.

56- Sem-VIII - REV- ANST- Digital Control System

(3 Hours)

# QP Code : 8164 [Total Marks : 100

Pitor A

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#### N.B.

- 1. Q.1 is compulsory. Attempt any four from the remaining questions.
- 2. All questions carry equal marks.
- 3. Figures to the Right indicate full marks.
- 3. Assume suitable data if necessary
- Q.1 Attempt any four
  - a. Explain digital control system with neat block diagram.
- b. State sampling theorem. What are the undesirable characteristics that may be exhibited in response if sampling theorem is not satisfied?
- c. Specify the region in z plane that corresponds to the shaded region in s plane as shown in Fig. 1.
- d. Explain controllability and observability of the system.
- f Explain sampler as an impulse modulator.
- e. Explain various types of continuous and discrete time signals.
- Q.2 A. Obtain the pulse transfer function with sampling rate  $T_s = 1 \sec$  for the system shown in 10 Fig.2.
  - B. Determine the stability of the system having characteristic equation

$$P(z) = z^3 - z^2 - 0.19z + 0.28 = 0$$

using Routh's Stability criterion.

Q.3 A. Derive the transfer function for the ZOH. B. Determine controllability and observability for the following system  $x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0.24 & -1.28 & 2.1 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k)$   $u(k) = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} x(k)$ 

Q.4 A. Obtain the pulse transfer function for the digital control system described by

$$\begin{aligned} x(k+1) &= Gx(k) + Hu(k) \\ y(k) &= Cx(k) + Du(k) \end{aligned}$$

B. Represent the following system into the observable canonical form.

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$$F(z) = \frac{z^2 - 1.2z + 0.35}{z^3 - 0.7z^2 + 0.14z - 0.008}$$





Fig. 2

RJ-Con. 10524-15.

## QP Code : 8164

- **Q.5 A.** Obtain the solution to the system of equation  $x(k+1) = \begin{bmatrix} 0.5 & 0 \\ 0 & -0.1 \end{bmatrix} x(k)$ . Assume initial 10 condition x(0) = (1, 0)' and sampling time 1sec.
  - B. Prove using similarity transformation that state space representation is not unique. Also 10 prove the invariance of eigenvalues under the similarity transformation.

Q.6 A. Design the state feedback control for the following system to place the poles at 0.5 and 0.2. 10

$$\Phi(k+1) = \begin{bmatrix} 0 & 1 \\ -0.88 & -1.9 \end{bmatrix} \Phi(k) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} \Gamma(k)$$

B. Determine the stability of the system using Lyapunov equation.

$$x(k+1) = \begin{bmatrix} 0 & 1\\ -1.5 & 2.5 \end{bmatrix} x(k)$$

Q.7 A. Derive the state transition matrix via recursion for the system

= 1811

$$x(k+1) = Gx(k)$$

XXX

B. Explain pole placement method using ackermann's formula

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Notes