Time: 3 Hrs   **Marks: 80**

Note:
1. Question No.1 is compulsory
2. Solve any THREE questions out of remaining FIVE questions.
3. Figure to the right indicate full marks.

1 Attempt Any Four Out of following.   20

    a. Draw drying curve and explain.

    b. What is shrink and swell effect? How it is reduced?

    c. Explain crystallization curve with suitable graph.

    d. Discuss types of distillation.

    e. Discuss hazardous area classification based on IEC standard..

Q.2

a) Give a classification of heat exchanger according to fluid flow arrangement.   10

b) Draw and explain three element boiler drum level control.   10

Q.3

a) Draw and explain top and bottom product composition control scheme for distillation.   10

b) What is runaway reaction? Explain temperature control in reactor using recirculation of
   jacketed fluid.   10

Q.4

a) Draw and explain steam temperature control using two stage superheaters.   10

b) Explain feedback control scheme for evaporator.   10

Q.5

a) Draw and explain control of evaporating crystallizer.   10

b) Draw and explain Penicillin-G production Process flow diagram and instrumentation required.   10

Q.6

a) Explain Intrinsic safety. How intrinsic safe instruments are installed in process?   10

b) What instrumentation hardware required in Iron and steel industry. Also draw process flow diagram
for iron and steel industry.   10

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Paper / Subject Code: 89402 / Digital Signal Processing

[Time:3 Hours]   [Marks:80]

N.B: Questions 1 compulsory, Remaining solve any three

Q.1   **Solve any four**   20
         a) Solve the following z-transform Using convolution property   5
            h(n)={1,2,3,4},y(n)={5,16,28,24}
         b) Explain any two property of DFT   5
         c) Find IDFT of (6,0,-2,0)   5
         d) Comparison of IIR and FIR filters   5
         e) Explain auto correlation and cross correlation   5

Q.2 A. Find whether the signal is periodic or not. if periodic find the fundamental period   10
         (i) $X(n)=e^{(j7\pi n)/4}$
         (ii) $X(n)=\sin(\pi n2/8)$

     B. Find the 8 point DFT using DIT–FFT algorithm   10
         $X(n)=\{1,2,1,2,0,2,1,2\}$

Q.3 A. Determine if the system described linear or nonlinear.   10
         a. $y(n)=nx(n)$
         b. $y(n)=y^2(n)$
     B. Perform circular convolution using DFT/IDFT   10
              $x(n)=\{1,3,2,1\}$ $h(n) =\{5,6,7,8\}$

Q.4 A. For the analog transfer function   10

$$(i) \quad H(s) = \frac{2s}{(s^2+0.2+1)}$$
$$(ii) \quad H(s) = \frac{(s+0.1)}{(s+0.1)^2+9}$$

         Determine H(z) using Bilinear transformation if a) T=1 sec
     B. Find out the cascade and parallel realization of   10
         $y(n)= -0.1y(n-1)+0.2y(n-2)+3x(n)+3.6x(n-1)+0.6x(n-2)$

Q.5 A. Design a linear phase FIR lowpass filter using rectangular window by taking 7   10
         samples of window sequence and with a cutoff frequency Wc=0.2π rad/sample
     B. Determine the impulse response h(n) for the system   described by the second-   10
         order difference equation,
         $y(n) - 4y(n - 1) + 4y(n -2) =x(n)-5 x(n -3)$.

Q.6   **Solve any two**   20
     A. Explain in detail different signal in terms   10
              1. Time delay
              2. Time Shift
              3. Time periodic
              4. Time advance
         Using equation and graphical presentation? With example
     B. Write any four properties of Z transform   10
     C. Write a short note on Sampling theorem and explain with example   10

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TE/INST/SEM-VI/C-2019/DEC.2022

Time: 3-hours   **Max. Marks: 80**

Question 1 is compulsory.
Answer any three questions from the remaining five questions (Q2 to Q6)

Q1 Answer any four   5mks *4=20

1. Define Biosensor as given by Mr. Clark. What is the Biosensor Architecture (blocks)
2. What is enzyme electrode?
3. Write in short about Immunosensors.
4. Explain the principle of piezoelectric Transducer?
5. What is FDA in food industry?
6. How to reduce noise in a system?

Q2 Answer the following   10mks *2=20

a. Which principle is used in Glucometer to measure diabetes? Explain clark's electrode
b. Memorize what is Action Potential. Sketch it and explain depolarization
   and refractory period

Q3 Answer the following   10mks *2=20

a. List the static characteristics of Biosensors. Explain repeatability
b. List the advantages of Fiber optic in biosensor and explain all

Q4 Answer the following   10mks *2=20

a. Classify chemical sensors and explain Chemiluminescence- based biosensors.
b. Illustrate with diagram electrode electrolyte interface

Q5 Answer the following   10mks *2=20

a. Explain Signal processing technique FFT
b. State the number of strain gauges used in Quarter bridge. Explain how
   Measurement is done

Q6 Answer the following   10mks *2=20

a. In which fields Biosensors are used. Explain in detail any one application
b. What are ION Selective electrodes Explain

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