JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 2 EXAMINATIONS - 2022

B. Tech. - IV Semester (BI)

COURSE CODE: 18B11MA411   MAX. MARKS: 25

COURSE NAME: BIOSTATISTICS

COURSE CREDITS: 3   MAX. TIME: 1 Hour 30 Min

Note: All questions are compulsory. Marks are indicated against each question in square brackets. Scientific calculators are allowed.

Q1. Show that the random process $X(t) = k\cos(nt + \theta)$ is wide-sense stationary process, if k, n are constants and θ is uniformly distributed random variable in $[0, 2\pi]$.   (CO-5)[5]

Q2. Differentiate between strict-sense and wide-sense stationary processes in a tabular form. Mention at least three points.   (CO-5)[3]

Q3. Define Markov chain. Give one real life example. Draw state diagram for the transition probability matrix, $\begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$. Also if initial probabilities are given by, $(0.7 \quad 0.2 \quad 0.1)$, then find the probabilities after one transition.   (CO-5)[1+1+1+2]

Q4. In a production line, items are inspected by quality control manager for defectiveness. The following is a sequence of defective items, D, and non-defective items N, produced by this production line:

D   D   N   N   N   D   N   N   D   D   N   N

N   N   D   D   D

Determine whether the defectives are occurring at random or not. [Given that: Critical value is 0.157]   (CO-3)[2]

Q5. The accompanying data refers to concentration of some chemical samples obtained from five randomly selected sweeteners in each of four different regions.

Region	1	5.4	4.8	5.5	6.7	5.1
	2	6.1	8.9	10.2	9.5	7.8
	3	4.7	4.9	7.2	5.6	4.1
	4	8.5	11.1	9.3	11.4	12.7

Test at 0.05 level of significance to see whether true average concentration differs for at least two of the regions. [Given that: $\chi^2_{0.05,3df} = 7.815$]   (CO-3)[5]

[P.T.O.]

Q6. Fit a linear regression model for the accompanying data on x = current density (mA/cm^2) and y = rate of deposition (μm/min) for plating of 60/40 Tin/Lead solder for head termination metallurgy.

x	20	40	60	80
y	0.24	1.20	1.71	2.22

Also find the rate of deposition if current density is 50 mA/cm^2.   (CO-1)[4+1]