Name. _____ **Printed Pages:02**

Student Admn. No.: _____

School of Basic & Applied Sciences
Backlog Examination, June 2023

[Programme: B.Tech (CSE)] [Semester: IV] [Batch: All]

Course Title: MATHS / Probability and Statistics **Max Marks: 100**

Course Code: BTCS2403 **Time: 3 Hrs.**

Instructions:
1. *All questions are compulsory.*
2. *Assume missing data suitably, if any.*

		K Level	COs	Marks
	SECTION-A (15 Marks) **5 Marks each**			
1.	One bag contains 4 white balls and 3 black balls, and a second bag contains 3 white balls and 5 black balls. One ball is drawn from the first bag and placed unseen in the second bag. What is the probability that a ball now drawn from the second bag is black?	K2	CO1	5
2.	Find the constant C such that the function $f(x)=\begin{cases} Cx^2 & for \quad 0<x<3 \\ 0 & else \end{cases}$ is density function and also compute $P(1<X<2)$	K3	CO1	5
3.	The number of incorrect answers on a true-false competency test for a random sample of 15 students was recorded as follows: 2, 1, 3, 0, 1, 3, 6, 0, 3, 3, 5, 2, 1, 4, and 2. Find (i) the mean, (b) the variance.	K2	CO2	5
	SECTION-B (40 Marks) **10 Marks each**			
4.	Determine the coefficient of correlation for ranks from the following data: $(5,8),(10,3),(6,2),(3,9),(19,12),(5,3),(6,17),$ $(12,18),(8,22),(2,12)\ (10,17)\ (19,20)$	K3	CO3	10
5.	Fit the following data to the straight line $y=a+bx$. X: 1, 3, 4, 6, 8, 9, 11, 14 Y: 1, 2, 4, 4, 5, 7, 8, 9	K3	CO4	10
6.	Two ballpoint pens are selected at random from a box that contains 3 blue pens, 2 red pens, and 3 green pens. If X is the number of blue pens selected and Y is the number of red pens selected, find (a) The joint probability function f(x, y), P[(X, Y) ∈ A], where A is the region {(x, y)|x + y ≤ 1}.	K3	CO4	10
7.	The probability that a patient recovers from a rare blood disease is 0.4. If 15 people are known to have contacted this disease, what is the probability that (a) At least 13 survive? (b) From 3 to 5 survive? (c) Exactly 5 survive? OR Given a normally distributed variable X with mean 18 and standard deviation 2.5, find P(X<15) (a) The value of k such that P(X<k)=0.2236. (b) (b) The value of k such that P(X>k) =0.1814. (c) P(17<X<21)	K4	CO3	10

<table>
<tr><th colspan="2">SECTION-C (45 Marks) 15 Marks each</th><th></th><th></th><th></th></tr>
<tr><td>8.</td><td>The average zinc concentration recovered from a sample of measurements taken in 36 different locations in a river is found to be 2.6 grams per milliliter. Find the 95% and 99% confidence intervals for the mean zinc concentration in the river. Assume that the population standard deviation is 0.3 gram per milliliter. How large a sample is required if we want to be 95% confident that our estimate of μ is off by less than 0.05?</td><td>K4</td><td>CO3</td><td>15</td></tr>
<tr><td>9.</td><td>Suppose that a large conference room at a certain company can be reserved for no more than 4 hours. Both long and short conferences occur quite often. In fact, it can be assumed that the length X of a conference has a uniform distribution on the interval [0, 4].
(a) What is the probability density function?
(b) What is the probability that any given conference lasts at least 3 hours? Find the mean and variance</td><td>K4</td><td>CO2</td><td>15</td></tr>
<tr><td>10</td><td>Find the multiple regression of x_1 on x_2 and x_3 from the data related to three variables given below:
<table>
<tr><td>x_1</td><td>4</td><td>6</td><td>7</td><td>9</td><td>13</td><td>15</td></tr>
<tr><td>x_2</td><td>15</td><td>12</td><td>8</td><td>6</td><td>4</td><td>3</td></tr>
<tr><td>x_3</td><td>30</td><td>24</td><td>20</td><td>14</td><td>10</td><td>4</td></tr>
</table>
OR

In Mendel’s experiments with peas, he observed 315 round and yellow, 108 round and green, 101 wrinkled and yellow, and 32 wrinkled and green. According to his theory of heredity the numbers should be in the proportion 9:3:3:1. Is there any evidence to doubt his theory at the (a) 0.01, (b) 0.05 level of significance?</td><td>K5</td><td>CO4</td><td>15</td></tr>
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