***BHARATIYA VIDYA BHAVAN'S***

# SARDAR PATEL INSTITUTE OF TECHNOLOGY

MUNSHI NAGAR, ANDHERI (WEST), MUMBAI – 400 058, India

(Autonomous College Affiliated to University of Mumbai)

**End Semester Examination(Special) Aug 2023**

Max. Marks: 100 Duration: 3hrs

Class: FYMCA Semester: II

Course Code: MA503 Date: /08/2023

Subject: Probability and Statistics Time: –

Instructions: (1) All questions are compulsory.
(2) Use of scientific calculator is allowed.
(3) Assume any necessary data but justify the same.

| Q.N | | Marks | CO |
|---|---|---|---|
| 1.(A) | The mean of the below data is 33, find the missing frequency.<br>Class Interval: 0-10 \| 10-20 \| 20-30 \| 30-40 \| 40-50 \| 50-60<br>Frequency: 10 \| 15 \| 30 \| ? \| 25 \| 20 | [5] | 1 |
| (B) | Find median of the following distribution.<br>Age (years): 20-25 \| 25-30 \| 30-35 \| 35-40 \| 40-45 \| 45-50 \| 50-55 \| 55-60<br>No of workers: 50 \| 70 \| 80 \| 180 \| 150 \| 120 \| 70 \| 50 | [5] | 1 |
| (C) | The average marks of a group of 100 students in Bio-statistic 60 and for another group of 50 students, the average marks are 90. Find the average marks of the combined group. | [5] | 1 |
| (D) | The following are runs scored by batsmen A in 10 matches. Find coefficient of variation of the runs scored.<br>101, 27, 0, 36, 82, 45, 07, 13, 65, 14 | [5] | 1 |
| 2. | Attempt any Two of the following. | [10] | 2 |
| (A) | Below are given the figures of production (in thousand tons) of a sugar factory<br>Year: 1969 \| 1970 \| 1971 \| 1972 \| 1973 \| 1974 \| 1975<br>Production: 77 \| 88 \| 94 \| 85 \| 91 \| 98 \| 90<br>Find the regression of production on year. | | |
| (B) | The regression line of y on x for a certain bivariate data is $5y+3x=52$ and the line of regression of x on y is $2x+y=30$.<br>Find (i) Arithmetic mean of x and y.<br>(ii) The coefficient of correlation between x and y.<br>Also find the most probable value of y when $x=10$. | [10] | 2 |
| (C) | The following are the marks obtained by 8 students in two subjects DS and PS. Calculate the Spearman's rank correlation coefficient.<br>Marks in DS: 20 \| 23 \| 23 \| 25 \| 27 \| 27 \| 32 \| 45<br>Marks in PS: 18 \| 22 \| 24 \| 29 \| 33 \| 36 \| 36 \| 36 | [10] | 2 |

<table>
<tr><td>3.<br>(A)</td><td>Attempt any TWO of the following.<br>The following table gives the number of car accidents in a city during a random week. Test whether the accidents are uniformly distributed or not?<br><table><tr><td>Day</td><td>Sun</td><td>Mon</td><td>Tue</td><td>Wed</td><td>Thu</td><td>Fri</td><td>Sat</td></tr><tr><td>No of accidents</td><td>10</td><td>17</td><td>11</td><td>13</td><td>17</td><td>14</td><td>16</td></tr></table>[Value of $\chi^2$ at 5% level of significance for degrees of freedom 6 is 12.595]</td><td>[10]</td><td>2</td></tr>
<tr><td>(B)</td><td>The specified diameter of a cylindrical part of a machine is 3 cm. A sample of 900 such parts shows an average diameter of 2.99cm. with standard deviation of 0.01 cm. Does the productdiffer in the specification? [Give at 1% level of significance $z_\alpha$=2.58]</td><td>[10]</td><td>2</td></tr>
<tr><td>(C)</td><td>A certain injection administrated to 12 patients resulted in the following changes of blood pressure<br>5, 2, 8, -1, 3, 0, 6, -2, 1, 5, 0, 4<br>Can it be concluded that the injection will be in general accompanied by an increase in blood pressure. (Given: The value of $t_\alpha$at 5% level of significance for 11 degrees of freedom is 2.201)</td><td>[10]</td><td>2</td></tr>
<tr><td>4.(A)</td><td>The joint distribution function (CDF) of X and Y is given by<br>$F_{XY}(x,y)=1-e^{-x}-e^{-y}+e^{-(x+y)}$, $x\geq 0,\ y\geq 0$<br>$=0$, otherwise<br>Find the marginal density functions of X and Y.<br>Are X and Y independent?</td><td>[15]</td><td>3</td></tr>
<tr><td>(B)</td><td>The probability that a person stopping at a petrol pump will ask for petrol is 0.8, will ask for water is 0.7 and for both is 0.65. Find the probability that a person will ask for neither petrol nor water.</td><td>[5]</td><td>3</td></tr>
<tr><td>5.(A)</td><td>Suppose a life insurance company insures the lives of 5000 persons aged 42 years. Studies show that the probability of any 42 year old person will die in a given year is 0.001. The data is said to follow Poisson distribution, find the probability that the company will have to pay at least two claims during a year.</td><td>[7]</td><td>4</td></tr>
<tr><td>(B)</td><td>In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find (i) How many students score between 12 and 15? (ii) How many score above 18?<br>[Given $P(0\leq Z\leq 0.4)=0.1554$, $P(0\leq Z\leq 0.8)=0.2881$, $P(0\leq Z\leq 1.6)=0.4452$]</td><td>[8]</td><td>4</td></tr>
<tr><td>(C)</td><td>The mean and variance of a binomial are 3 and 2 respectively. Find the probability that the variate takes the values less than or equal to 2.</td><td>[5]</td><td>4</td></tr>
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