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 July 2023

Max. Marks: 100 Duration: 3hrs

Class: FYMCA Semester: II

Course Code: MA503 Date: 01/07/2023

Subject: Probability and Statistics Time: 10am–01pm

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)	Find the missing frequency of the following, if mode=136cms.	[5]	1

x	120-125	125-130	130-135	135-140	140-145	145-150
f	7	10	18	?	12	7

(B)	The mean marks in statistics of 100 students in a class was 72. The mean marks of boys was 75, while their number was 70. Find mean marks of girls in the class.							[5]	1
(C)	Find median of the following distribution.							[5]	1

C.I.	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	8	7	12	28	20	10	10

(D)	The following are runs scored by batsmen A in 10 matches. Find coefficient of variation of the runs scored. 101, 27, 0, 36, 82, 45, 07, 13, 65, 14	[5]	1
2.	Attempt any Two of the following.	[10]	2
(A)	For the data regarding availability of sugar (in kg per annum) fit a linear regression and estimate the availability for the year 1996.		

Year	1991	1992	1993	1994	1995
Consumption	7.3	6.1	6.0	6.8	6.1

(B)	Given the equation of the two regression lines as: x=4y-38, x=9y-288. Calculate (i) the two regression coefficients, (ii) the coefficient of correlation between x and y. Also estimate the most probable value of y when x=90.	[10]	2
(C)	The following are the marks obtained by 8 students in two subjects CG and PS. Calculate rank correlation coefficient.	[10]	2

Marks in CG	15	20	28	12	40	60	20	80
Marks in PS	40	30	50	30	20	10	30	60

3. (A)	Attempt any TWO of the following. The following table gives the number of aircraft accidents that occurred during various days of the week. Mon: 15 | Tue: 19 | Wed: 13 | Thu: 12 | Fri: 16 | Sat: 15 Test if the accidents are uniformly distributed over the week. (Chi square value at 5% level of significance at 5 degrees of freedom is 11.07)	[10]	2
(B)	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 product differ the specification? [Give at 1% level of significance z_α=2.58]	[10]	2
(C)	The means of two random samples of sizes 9 and 7 are 196 and 199 respectively. The sum of the squares of the deviations from the mean is 27 and 19 respectively. Can the samples be regarded to have been drawn from the same normal population? (Given: The critical value at 5% LOS and 14 degrees of freedom is t_α=2.145).	[10]	2
4.(A)	The joint distribution function (CDF) of X and Y is given by $F_{XY}(x,y)=1-e^{-x}-e^{-y}+e^{-(x+y)}$, $x\geq 0,\ y\geq 0$ $=0$, otherwise Find the marginal density functions of X and Y. Are X and Y independent?	[15]	3
(B)	An MCA applies for a job in two firms X and Y. The probability of his being selected in firm X is 0.7 and being rejected at Y is 0.5. The probability of at least one of his applications being rejected is 0.6. What is the probability that he will be selected in one of the firms?	[5]	3
5.(A)	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.	[7]	4
(B)	The age of mobile is normally distributed with mean of 12 years and standard deviation of 4 years. Find the probability that (i) age of mobile is at least 20 years. (ii) age of mobile is between 0 and 20 years. [Given $P(0\leq Z\leq 2)=0.4772$, $P(0\leq Z\leq 3)=0.49865$]	[8]	4
(C)	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.	[5]	4

---x---x---x