DEPARTMENT OF MATHEMATICS

Course: Fundamentals of Linear Algebra, Calculus and Statistics	IMPROVEMENT TEST	Maximum marks: 10+50=60
Course code: 22MA11C	First semester 2022-2023 Chemistry Cycle Branch: AI, BT, CS, CD, CY, IS, SPARK C	Time: 2pm to 4pm Date: 20-03-2023

Instructions to candidates:
    i.   Part A must be answered within the first two pages of the Booklet.
    ii. Answer all questions.

Q.No	PART- A	M	BT	CO
1.1	If the correlation co-efficient is zero, then the two regression lines are _____ to each other.	1	L1	1
1.2	If $y = e^{at}$ is the best exponential curve for the data points $(x_i, y_i), i \in \{1,2,3,...n\}$, then $a =$ _____.	2	L2	2
1.3	The value of the integral $I = \int_0^2 \int_0^1 e^{x+y}\, dxdy$ is _____.	2	L2	1
1.4	The first raw moment about the point 20 is 50 then its mean is _____.	2	L1	1
1.5	Let $\sum x = 50, \sum y = 80, \sum xy = 1030, \sum x^2 = 750$ for a dataset (x_i, y_i), where $i \in \{1, 2, 3 ...,10\}$. The best straight line fit for the given data is _____.	2	L2	2
1.6	The skewness of a normal distribution is _____.	1	L1	1

Q.No	PART -B	M	BT	CO
1.a	The first four moments about the working mean 28.5 of a distribution are 0.294, 7.144, 42.409 and 454.98. Calculate the moments about the mean, co-efficient of skewness and kurtosis using moments. Also, comment upon the skewness and kurtosis of the distribution.	6	L2	1
1.b	In a partially destroyed laboratory record, only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y - 107 = 0$ respectively. Calculate the mean values of x, y and the coefficient of correlation between x and y.	4	L3	3
2.a	Ten people of various heights were requested to read letters on a car at 25 yards distance. The number of letters correctly read is as given below:	6	L2	2

Height (in feet)	5.1	5.3	5.6	5.7	5.8	5.9
No. of letters	11	17	19	14	8	15

Is there any correlation between heights and visual power?

| 2.b | For two cities Kolkata and Mumbai, prices of commodities are given below: | | 4 | L2 | 3 |

City	Kolkata	Mumbai
Average Price	65	67
Standard Deviation	2.5	3.5

Correlation co-efficient between the prices of commodities in the two cities is 0.8, then find the most likely price in Mumbai corresponding to the price of ₹.70 at Kolkata.

3	The velocity V of a liquid is known to vary with temperature according to a quadratic law $V = a + bT + cT^2$. Find the best values of a, b and c for the following observations: 	T	1	2	3	4	5	6	7
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V	2.31	2.01	3.80	1.66	1.55	1.47	1.41 | Calculate V when T = 9.	10	L3	3
4.a	The data from an experiment is given below. The variables y and x are connected by the relation $y = ax^b$, where a and b being constants. Fit this equation to the data by finding the values of a and b: 	x	350	400	500	600
y	61	26	7	26		6	L2	2
4.b	Evaluate the double integral $$\int_0^1 \int_0^{\sqrt{1+x^2}} \frac{1}{1 + x^2 + y^2} \, dy \, dx.$$	4	L2	2
5	Let D be a region bounded by $x = y^2, y = x - 2$ i) Sketch the region D in the xy − plane. ii) Evaluate the double integral $\iint_D y \, dA$.	10	L3	4

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Quiz & Test	Max Marks	12	20	18	10	4	32	24	--	-	-

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

***********ALL THE BEST************