

**IMBA Sem.-4 Examination
Business Statistics**

Time : 2-30 Hours]

April-2025

[Max. Marks : 70

Note: 1. Attempt each question on new page.

2. Non-programable scientific calculator and Statistical tables are allowed.

Q-1. Attempt any **TWO** of the following:

[14]

- A.** Give properties and uses of Hyper Geometric Distribution.
- B.** There are 3 defective motherboards in a package of 10. Two are randomly selected without replacement. Find the probability distribution for the random variable x which represents the number of defective motherboards selected.
- C.** The average number of errors on a page of a certain magazine is 0.2. What is the probability that the next page (or randomly selected page) you read contains?
 (i) 0 error
 (ii) 2 or more errors

Q-2. Attempt any **TWO** of the following:

[14]

- A.** Give properties and uses of Exponential Distribution.
- B.** A new tax law is expected to benefit "middle income" families, those with incomes between Rs. 20,000 and Rs. 30,000. If Family income is in normal distribution with average of Rs. 25,000 and standard deviation is of Rs. 10,000. What percentage of the population will benefit from the law?
- C.** The interval, X seconds, between cars passing a point on a motorway follows an exponential distribution with probability density function

$$f(x) = \begin{cases} 2e^{-2x}, & x \geq 0 \\ 0, & \text{otherwise} \end{cases}$$
 (i) Calculate the mean and variance of X .
 (ii) Determine the cumulative distribution function.
 (iii) Calculate the probability that the interval until the next car passes between 1 and 2 seconds.

Q-3. Attempt any **TWO** of the following:

[14]

A. Find the number of pair of observations from the following data:

$$r = 0.25, \sum (x_i - \bar{x})(y_i - \bar{y}) = 60, \quad \sigma_y = 4, \sum (x_i - \bar{x})^2 = 90$$

- B.** From the following data prepare 2×2 contingency table. Also, Compute Yule's Coefficient of Colligation and hence, determine the Yule's Coefficient of Association. Discuss whether there is any association between literacy and unemployment.
 Illiterate Unemployed 250 persons
 Literate Employed 25 persons
 Illiterate Employed 180 persons
 Total number of persons 500 persons
- C.** Find Spearman's Rank correlation coefficient between the two kinds of assessment of graduate students' performance in a college:

Name of students	A	B	C	D	E	F	G	H	I	J
Internal Exam	85	80	90	70	60	75	54	55	45	35
External Exam	78	82	88	75	65	85	60	55	40	32

Q-4. Attempt any **TWO** of the following:

[14]

- A. Compute the two Regression coefficients of equation on the basis of the following information:

	X	Y
Mean	42	88
Standard Deviation	12.5	8.5

The Karl Pearson's correlation coefficient between x and y is 0.70.

- B. From the following data obtain the Regression equation of y on x by the method of Least square:

X	10	12	16	11	15	14	20	22
Y	15	18	23	14	20	17	25	28

- C. Calculate the correlation coefficient between class of X and class of Y for the following bivariate frequency distribution:

Class of X	Class of Y				
	10-20	20-30	30-40	40-50	50-60
15-25	6	3	-	-	-
25-35	3	16	10	-	-
35-45	-	10	15	7	-
45-55	-	-	7	10	4
55-65	-	-	-	4	5

Find the regression equation of X on Y.

- Q-5. A. Calculate Partial Correlation coefficient $r_{13.2}$ and Multiple Correlation coefficient $R_{2.13}$ from the following data:

[7]

$$r_{12} = -0.369, r_{13} = 0.918, r_{23} = -0.245$$

- B. Determine the multiple regression equation of x_3 on x_1 and x_2 from the following data:

[7]

x_1	3	8	11	13
x_2	4	9	8	12
x_3	2	5	7	9
