

Seat No. : _____

AC-129

April-2023

Int. MBA, Sem.-IV

Business Statistics

Time : 2:30 Hours]

[Max. Marks : 70

- Instructions :** (1) Statistical tables will be Provided on demand.
(2) Use of Non-programmable scientific calculator is allowed.

1. Attempt any **two** : 14

- (1) With the usual notations, find p for the binomial random variable X if n = 6 and if $9P(X = 4) = P(X = 2)$.
- (2) In a certain factory turning out optical lenses, there is a small chance $\frac{1}{500}$ for any one lens to be defective. The lenses are supplied, in packets of 10. Use Poisson distribution to calculate the no. of packets containing no defective, two defective, three defective lenses respectively in a consignment of 20,000 packets. ($e^{-0.02} = 0.9802$)
- (3) Explain hyper geometric distribution with its properties.

2. Attempt any **two** : 14

- (1) In normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.
- (2) The price of the well-known brand box range is from ₹ 2.80 to ₹ 3.14, assume these prices are uniformly distributed. What are the average price and standard deviation of prices in this distribution ? If price is randomly selected, what is the probability that it will be between ₹ 3 to ₹ 3.10 ?
- (3) Define uniform distribution. Also write its properties.

3. Attempt any two : 14
- (1) The covariance of two perfectly correlated variables X and Y is 96. Determine σ_x and σ_y if it is known that the variance of x and that of y is in the ratio of 4 : 9.
- (2) Family income and its percentage spent on food in the case of hundred families gave the following distribution. Calculate the co-efficient of correlation and interpret it.

Food expenditure in (%)	Family income (₹)				
	200-300	300-400	400-500	500-600	600-700
10 – 15	–	–	–	3	7
15 – 20	–	4	9	4	3
20 – 25	7	6	12	5	–
25 – 30	3	10	19	8	–

- (3) In a population of 1000 students, the number of married students is 400. Out of 300 students who failed, 120 belong to the married group. Using Yule's co-efficient to determine the association between marriage and failure.
4. Solve the following : 14
- (1) In the estimation of regression equation of two variables X and Y the following results were obtained:
 $\sum x = 900$, $\sum y = 700$, $n = 10$, $\sum xy = 3900$, $\sum x^2 = 6360$, $\sum y^2 = 2860$, where x and y are deviation from respective means. Obtain two regression lines.
- (2) The lines of regression of a bivariate population are :
 $8x - 10y + 66 = 0$ and $40x - 18y = 214$ and the variance of x is 9.
 Find : (a) The mean values of x and y.
 (b) Correlation co-efficient between x and y.
 (c) Standard deviation of y.

5. Attempt any two : 14
- (1) In a trivariate distribution, if $r_{12} = 0.7$, $r_{13} = 0.61$ and $r_{23} = 0.4$ find all the multiple correlation co-efficients. Also obtain the standard errors of estimates $\sigma_{1.23}$, $\sigma_{2.13}$ and $\sigma_{3.12}$.
- (2) In a certain trivariate distribution $r_{12} = 0.7$, $r_{13} = r_{23} = 0.6$ and $S_1 = 3$, $S_2 = S_3 = 5$
 Find : (a) The partial correlation coefficients $r_{12.3}$.
 (b) Regression co-efficients $b_{12.3}$.
- (3) If all the correlation co-efficients of zero order are equal to ρ , prove that $r_{13.2} = \frac{\rho}{1 + \rho}$ hence, using the relationship between total, multiple and partial correlation co-efficients, prove that $1 - R^2_{1.23} = \frac{(1 - \rho)(1 + 2\rho)}{1 + \rho}$.