

Cutting, Overwriting, Erasing, Fluid painting and use of Lead Pencil will earn no marks.
 Write answer of the Question No.1 and 2 on this sheet and handover it to the supervisory
 staff of examination within first 35 minutes.

Time Allowed: 35 Minutes

(OBJECTIVE PART)

Max. Marks: 32

**Sign of
 Supdt.**

1- a) Encircle the correct answer:

1x4

i) Moment generating function of the distribution about mean a is $M_a(t) =$

a) $E(e^{tx})$

b) $e^{t(x-a)}$

c) $E(e^{t(x-a)})$

d) e^{ta}

ii) The expectation of the product of two independent variates X and Y is equal to

a) $E(X) E(Y)$

b) $E(X) \pm E(Y)$

c) $E(X + Y)$

d) None of these

iii) The normal distribution will be less spread out when

a) The mean is small

b) The Median is small

c) The mode is small

d) The Standard Deviation is small

iv) If both the dependent and independent variables increases simultaneously, the correlation coefficient will be in the range of

a) 0 to +1

b) 0 to -1

c) 1 to 2

d) -1 to +1

b) Encircle True or False:

1x8

i) Sum of probability for any probability distribution is equal to zero.

TRUE / FALSE

ii) The expected value of a constant is zero.

TRUE / FALSE

iii) In a binomial distribution the mean is equal to its variance.

TRUE / FALSE

iv) Random sampling and probability sampling are same.

TRUE / FALSE

v) Regression Coefficient is independent of origin.

TRUE / FALSE

vi) The sum of residual from least square line is negative.

TRUE / FALSE

vii) The F-distribution is positively skewed and ranges from zero to infinity.

TRUE / FALSE

viii) In a standard normal distribution mode is zero.

TRUE / FALSE

c) Fill in the blanks meaningfully:

1x4

i) Mean and variance of hypergeometric distribution are _____ and _____ respectively.

ii) Correlation Coefficient is independent of _____ and _____.

iii) The mean of β_1 (m, n) distribution is _____.

iv) The range of χ^2 -distribution _____.

(Continued Overleaf)

2- Give short answers of the following questions:

2x8

i) Define Binomial Distribution.

ii) Write Four Properties of Normal Distribution.

iii) Find the Mean of Poisson's distribution.

iv) Write the Assumption of F-distribution.

v) Define Partial Correlation.

vi) Explain the principle of least square.

vii) Define Moment Generating Function.

viii) Write Two Properties of t-distribution.

SUBJECTIVE PART

- 3- a) If A, B, C are any three events in a sample space S then the probability of at least one of them occurring is given by

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(A \cap C) + P(A \cap B \cap C).$$
 9
 b) Show by direct calculation that the 2nd and 3rd moments of the binomial distribution about $x = 0$ are

$$\mu'_2 = np[(n-1)p+1] \quad \mu'_3 = np[(n-1)(n-2)p^2 + 3(n-1)p+1]$$
 and deduce $\mu_2 = npq$, $\mu_3 = npq(q-p)$ 8
- 4- a) Derive the Probability Law for Poisson's Distribution. 9
 b) Calculate the first four moments about the mean position of a Poisson's distribution and the result by direct calculation. 8
- 5- a) Find the Mean and Variance of Hypergeometric Distribution. 9
 b) Show that the Variance of the Normal Distribution is σ^2 and the Mean Deviation is approximately $\frac{4}{5}$ of its standard deviation. 8
- 6- a) What is Beta Distribution of 1st kind. Find the Mean and Variance of this distribution. 9
 b) Prove that the product of two independent $r(\ell+m)$ and $\beta_1(\ell, m)$ variate is a $r(\ell)$ variate. 8
- 7- a) Show that the χ^2 -distribution with n degree of freedom the moment about the mean obey the relation $\mu_{r+1} = 2r(\mu_r + n\mu_{r-1})$ 9
 b) Derive the student's T-distribution Probability Law. 8
- 8- a) What is Linear Regression? Find the equation of Line of Regression of y on x. 9
 b) Find the tangent of the inclination between the Lines of Regression of y on x and x on y. Also interpret the result when $r = 0$ and $r = \pm 1$. 8