PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2023
(Second Semester)

Branch – **STATISTICS**

DISTRIBUTION THEORY

Time: Three Hours | Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 If x and y are normally distributed with mean 0 and SD 1 then the distribution of x/y is
(i) cauchy distribution (ii) laplace distibution
(iii) gamma distribution (iv) beta distribution

2 Moment generating function of χ^2 is _____.
(i) $(1-2it)^{n/2}$ (ii) $(1-2it)^{n}$
(iii) $(1-2it)^{-n/2}$ (iv) $(1-2it)^{-n}$

3 Characteristic function of multivariate normal distribution is $C_x(t)$ = _____.
(i) $e^{it'\mu+1/2t'\Sigma t}$ (ii) $e^{it'\mu-1/2t'\Sigma t}$
(iii) $e^{it'\mu-2t'\Sigma t}$ (iv) $e^{it'\mu-}$

4 Wishart distribution is the generalized form of _____.
(i) normal distribution (ii) F distribution
(iii) t distribution (iv) χ^2 distribution

5 Pair of variables obtained by canonical variables has _____ correlation.
(i) maximum (ii) minimum
(iii) zero (iv) can be defined

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a What is censoring and write a brief note on left and right censoring?
OR
b Find the mean of right truncated Binomial distribution at x=n.

7 a Derive the cumulative distribution function of a single order statistic.
OR
b Derive non-central F distribution.

8 a What is distribution of linear function with y=cx?
OR
b Derive the characteristic function of multivariate normal distribution.

9 a State Wishart distribution and give its property.
OR
b List the Reproductive property and its uses.

10 a Explain the concept of classification.
OR
b What is factor analysis and how it is differ from PCA?

Cont...

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a In a left truncated normal distribution when all values of X<a are missing, if x is a standard normal variate find its mean.

OR

b If X and Y are independent with a pdf

$f(u) = e^{-u}$ $u \geq 0$

0 otherwise

Find the pdf of X-Y.

12 a Derive the distribution of non central χ^2 distribution.

OR

b Derive the p.d.f of non-central t distribution.

13 a Prove the marginal distribution of x_1 and x_2 and also prove the normal with mean μ_i and covariance $\sum_{ii}$ where i =1,2 respectively.

OR

b Derive the distribution of quadratic function in normal variables.

14 a Derive the distribution of Hotelling's T^2 statistic.

OR

b Derive Mahalanobis D^2 distribution and discuss the relationship between T^2 and D^2 Statistic.

15 a Elaborate Discriminant analysis in detail.

OR

b Explain principal component analysis and give is applications.

Z-Z-Z END