Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
(Autonomous)
End Semester Examination: March/April 2024
Faculty: Science and Technology
Semester: IV

Program: BScGen03   **SET: B**
Program (Specific): General B.Sc.   **Course Type: CC**
Class: S. Y. B. Sc. (General)   **Max. Marks: 35**
Name of the Course: CONTINUOUS DISTRIBUTIONS AND EXACT TESTS
Course Code: 23-ST-242   **Time: 2Hrs**
Paper: II

Instructions to the candidate:

1) *There are 5 questions in the question paper. Write each question on separate page.*
2) *All questions are compulsory.*
3) *Figures to the right indicate full marks.*
4) *Draw a well labelled diagram wherever necessary*
5) *Use of statistical tables and scientific calculator are allowed.*

Q1) Choose the correct alternative in each of the following: **[1x5=5]**

1) Chi Square distribution is:

   a) positively skewed   b) negatively skewed
   c) symmetric   d) cannot say

2) Variance of Student's t distribution with 4 degrees of freedom is.
   a) 0   b) 1/2
   c) 2   d) infinity

3) Mean Snedecor's F distribution is:
   a) 1   b) greater than one
   c) 2   d) less than one

4) For testing fitting of certain distribution with p unknown parameters and with k distinct
   Observations, degrees of freedom for chi square distribution is

   a) k-p-1   b) k-p+1
   c) k+p+1   d) k+p-1

5) Range of bivariate normal distribution is:

   a) (0,1) X (0,1)   b) (-1,0) X (-1,0)
   c) (0, ∞) X (0, ∞)   d) (-∞, ∞) X (-∞, ∞)

Q2) a) State whether the following is true or false (Any two) [1 x 2=2]

1) For chi square distribution mean=2*variance.
2) For Student's t distribution the third order central moment is zero.
3) If X follows F distribution with degrees of freedom=(3,4) then $\dfrac{1}{X}$ follows F distribution with degrees of freedom=(1/3,1/4).

b) Define/State the following: (Any two) [1 x 2=2]

1) State the quartiles of Student's t distribution with 4 degrees of freedom.
2) Write the formula of test statistic used for testing the equality of two independent normal population means based on small sample.
3) Obtain the cov(X,Y) where (X, Y) ~ BN(3,5,36,64,0.4).

Q3) Attempt any two from the following: [2 x 4=8]

1) $X \sim t_{15}$ find i) c such that P(|X| >c)=0.8 ii) k such that P(X >k)=0.1

   iii) d such that P(X^2< d)=0.4.

2) State the procedure for testing the population variance for small sample.
3) Derive joint moment generating function of standard bivariate normal distribution and hence obtain expected value.

Q4) Attempt any two from the following [2x4=8]

1) State and prove additive property of Chi-square distribution
2) On the basis of following data can we say that two attributes are independent? Use 5% level of significance.

		Cleanliness of Mother	
		Yes	N0
Cleanliness	Yes	120	30
of Child	No	50	100

3) If (X,Y) ~BN(20, 25, 4, 9, 0.5).
   Find a) E(X+Y)   b)Var(X+Y)   c) E((X-Y)X).

Q.5) Attempt any two from the following [2x 5=10]

1) Derive the central moments of F distribution
2) Write the test procedure for paired t test.
3) State and prove unique property of bivariate normal distribution.

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