

(Time: 2 $\frac{1}{2}$ Hours)

[Total Marks: 75]

- N.B. 1) All questions are compulsory.
2) Figures to the right indicate marks.
3) Illustrations, in-depth answers and diagrams will be appreciated.
4) Mixing of sub-questions is not allowed.

Q. 1 Attempt All the questions

(15M)

Multiple choices questions

(a) 1 The mean of the binomial distribution is -----

- a) npq b) np c) pq d) nq

2 Cumulative distribution function is a ----- continuous function

- a) Right b) Left c) Bounded d) None of above

3 The critical region is region of -----

- a) Rejection b) Acceptance c) positive d) Negative

4 For a two sided test the Rejection region lies at ----- tails

- a) One b) two c) both a & b d) None of above

5 Chi square test of association is used for ----- data

- a) Qualitative b) Quantitative c) Time series d) Geographic

(b) **Fill in the blanks.**

1 The curve of Normal distribution is -----

2 Number of children in a family is a ----- random variable

3 ANOVA is used for testing -----

4 Power of statistical test must always be -----

5 Sign test is a ----- test

(c) **Answer in one sentence**

1 Define discrete random variable with an example

2 State one property of the Normal distribution

3 Write the sample space when a coin is tossed two times

4 Describe the curve of the F distribution

5 Define type I error for a statistical hypothesis

Q. 2 Attempt the following (Any THREE)

(15M)

(a) Define probability density function, cumulative distribution function and expectation for a continuous random variable X.

(b) State the density function of the chi square distribution and any two properties of it.

(c) Define t distribution. Write any two properties of the same

(d) Explain briefly the Normal distribution with the help of its curve

(e) Define a Binomial distribution? State the mean and variance of the Binomial distribution

(f) Chances that a student of Mumbai university clears UPSC exam are 70 %. If 20 students appear for the exam, what is the chance that more than 3 students and exactly 8 students will clear the exam.

- Q. 3** Attempt the following (Any THREE) (15M)
- (a) Define null and alternative hypothesis. State an example of null hypothesis
 (b) Describe the paired t test with an example.
 (c) Distinguish between type I and type II error
 (d) Describe the large sample test for testing $H_0: \mu = \mu_0$ against $H_1: \mu > \mu_0$
 (e) Explain briefly ANOVA with an example of one way ANOVA
 (f) A health club advertised a weight reducing program and claimed that it will reduce the weight in 3 months. To check the claim 10 persons before and after weight was noted. Does the data support the claim at 1 % Level of significance.
 Table value=2.822

No	1	2	3	4	5	6	7	8	9	10
Wt before	61	65	68	72	75	73	74	66	69	82
Wt after	52	54	60	62	67	66	64	59	60	76

- Q. 4** Attempt the following (Any THREE) (15)
- (a) Explain in short Non parametric tests
 (b) Write a short note on Wilcoxon's signed rank test
 (c) State the test statistics for Mann Whitney U test and Kruskal Wallis test
 (d) Explain the concept of post hoc Analysis of variance
 (e) Write a short note on Chi square test of Association
 (f) Test if there is an association between gender and acceptance of application for the following data. (Table value at 5% LOS=3.84)

	Application successful	Application not successful	TOTAL
Male	23	40	63
Female	31	39	70
TOTAL	54	79	133

- Q. 5** Attempt the following (Any THREE) (15)
- (a) Define probability mass function and expectation of a discrete random variable
 (b) Define one sided and two sided hypothesis
 (c) Write a short note on sign test
 (d) Differentiate between parametric and non parametric tests
 (e) If X follows binomial (3,0.5) find the mean and variance
