

Roll No.....

Total No. of Printed Pages: 2

Total No. of Questions: [11]

M.Sc. (Chemistry) (Semester – 1st)

STATISTICAL METHODS

Subject Code: MMAT0-F91

Paper ID: [OE1220214]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It carries 16 marks. It consists of 4 questions of 4 marks each.
2. Section B consist of 4 questions of 8 marks each. The student has to attempt any 3 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(4 marks each)

Q1. Fit a straight line to the following data

x	1	2	3	4	6	8
y	2.4	3	3.6	4	5	6

Q2. Find the distribution function of X , whose PDF is given by

$$f(X) = \begin{cases} 2x, & 0 \leq x \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

Q3. For any three events A, B, C , show that

$$P(A \cup B | C) = P(A | C) + P(B | C) - P(A \cap B | C)$$

Q4. What is the relationship between t and F statistics?

Section – B

(8 marks each)

Q5. Calculate mean, median and mode for the following:

Intervals	90-100	100-110	110-120	120-130	130-140	140-150	150-160	160-170
Frequency	10	37	65	80	51	35	18	4

Q6. If X and Y are random variables taking real values, then $[E(XY)]^2 \leq E(X)^2 E(Y)^2$

Q7. State and prove Bayes' theorem.

Q8. Discuss the applications of t distribution for testing of significance of (i) single mean and (ii) difference between means.

Section – C

(10 marks each)

Q9. The lines of regression are given by $X+9Y=7$ and $Y+4X=17$. If $\sigma_x^2 = 18$

Find coefficient of correlation 'r', \overline{X} , \overline{Y} , σ_Y and estimated value of X when $Y=10$, where symbols have usual meanings.

Q10. Let X and Y are two random variables having joint density function

$$f(x, y) = \begin{cases} \frac{1}{8}(6-x-y), & 0 \leq x \leq 2, 2 \leq y \leq 4 \\ 0, & \text{otherwise} \end{cases}$$

(a) Find the marginal density functions of X and Y

(b) Find $P(X < 1 \cap Y < 3)$, $P(X + Y < 3)$ and $P(X < 1 | Y < 3)$

Q11. (a) A and B are two independent events. The probability that both A and B occur is $1/6$ and the probability that neither of them occurs is $1/3$. Find the probability of occurrence of A .

(b) Define Poisson distribution. Obtain its mean and variance. (5+5)