MMDSE-3.6

Sl.No. :

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III Semester M.Sc. Degree Examination, May/June - 2026
(SLM Scheme, CBCS)
MATHEMATICS
Course-VI:Mathematical Statistics

Time : 3 Hours **Max. Marks : 80**

Instruction : ***Answer any five full questions.***

Q1) a) Explain various measures of central tendency.

b) Find weighted arithmetic mean of first n natural numbers, where weights being the corresponding but opposite numbers.

c) Write the merits and demerits of mode. **[8+6+2]**

Q2) a) What are the measures of dispersion? Explain them.

b) Find Q_1,Q_3, D_3 and P_{20} for the following.

Weight in kgs	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No.of persons	3	5	10	18	9	7	2

[8+8]

Q3) a) Define:

(i) Probability measure

(ii) Event

b) For any three events A,B and C show that

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

c) A doctor is to visit a patient and from past experience it is known that the probability that he will come by train, bus or scooter are respectively $3/10$, $1/5$ and $1/10$, the probability that, he will come by some other means of transport being therefore $2/5$. If he comes by a train, the probability that he will be late is $1/4$ if by bus is $1/3$ and if by scooter is $1/12$. If he uses some other means of transport it can be assessed that he will not be late. Then

i) What is the chance he will be late?

ii) What is the probability that he comes by train?

[4+6+6]

Q4) a) State and prove 4 properties of variance.

b) Establish De-Moivre's Laplace Theorem for central limit Theorem for iid random variables.

[8+8]

Q5) a) Define Poisson distribution. Obtain its variance.

b) In a college, 70% of the students are boys. In a random sample of 3 students, find the probability of getting

i) two boy's

ii) at least one boy.

c) State features of binomial distribution.

[9+4+3]

Q6) a) If X follows exponential distribution with parameter θ, obtain its mean.

b) Write a note on Chi-squared distribution.

c) The mean and standard deviation of a normal distribution is 15 and 4 respectively. Find the upper and lower quartiles.

[5+5+6]

Q7) a) Differentiate Null and Alternate hypothesis.

b) Write large sample test procedure for single mean of the population.

c) The mobile manufacturer states that less than 3% of the mobiles he provided to a certain mobile store are defects. A sample of 500 mobiles revealed that 10 were defects. Test his statement at 1% level of significance.

[5+5+6]

Q8) a) Explain the small sample test procedure to test the difference between the means of two populations.

b) Two different types of drugs P and Q were tried on a certain patients for increasing weight. 5 persons were given drug P and 7 person were given drug Q. The increase in weight in pounds is given below.

Drug P :	8	12	13	9	3		
Drug Q :	10	8	12	15	6	8	11

Do the two drugs differ significance with regarded to their effect in increase weight? Test at 5% level of significance.

c) Following are the production of paddy in 8 different years. 6, 9, 13, 7, 14, 12, 3 and 8 tons Test the hypothesis that the standard deviation is more than 3 tons?

[5+6+5]