MMA-C 112
M.Sc.
Examination-2021
Subject: MATHEMATICS
Paper Name: Mathematical Statistics

Time: 3 hrs. MM:70

Section – A

Attempt any five questions. Each question carries 6 marks. (5x6=30)

1. Define independent and mutually exclusive events. Can two events be mutually exclusive as well as independent simultaneously.
2. A and B are two independent witnesses in a case. The probability that A will speak truth is x and that B will speak truth is y. A and B agree in a certain statement. Show that probability is true i.e., .
3. Let X~B.D. write an expression for:
   i) The prob. of at the most r successes.
   ii) The prob. of at least r successes.
4. Comment on the following:

   Fora Bionomical Distribution, mean = 7, Variance = 11.
5. If a random variable X follows Poisson distribution such that P (X = 1) = P (X = 2), find the mean and variance of distribution.
6. Explain Test of Hypotheses and Significance.
7. Write a note on Type I and Type II Errors.
8. Find the point of inflection of the normal curve $y = y_o$ and show that it occurs at a distance σ from the mean ordinate.
9. Give criteria of Best Estimator.
10. A can solve 75% of the problem in a book and B can solve 70%. What is the probability that either A or B can solve a problem chosen at random?

Section – B

Attempt any four questions. Each question carries 10 marks. (4x10=40)

1. (a) If f(x) has prob. density , , determine K and find P .

(b) If P(X=2) = 9 P(X=4) + 90 P(X=6) in a Poisson distribution then find mean.

2. (a) If $x_1, x_2 \ldots x_n$ is a random sample from a normal population having mean and variance unit, then show that is unbiased estimator of +1.

   (b)Prove that sample mean is an unbiased estimate of the population mean.

3. A factory has 3 machines A, B and C, producing 1000, 2000 and 3000 bolts per day respectively. A produces 1% defective, B 1.5% and C 2% defective. A bolt is checked at random at the end of a day and is found to be defective. What is the probability that it came from machine A?
4. If the probability of defective bolt is 1/10, find (i) the mean; (ii) variance

   (iii) moment coefficient of skewness, for the distribution of defective bolts in a total of 400.

   Also,if 5% of electric bulbs manufactured by a company are defective, use Poisson distribution to find the probability that in a sample of 100 bulbs

   (i) none is defective, (ii) 5 bulbs will be defective. ($e^{-2} = 0.007$).

5. In a normal distribution, 31% of items are under 45 and 8% are over 64. Find the mean and standard deviation of distribution. [P(1.4) = 0.42, P(0.49) = 0.19.]
6. The following information are given:

	X-series	Y-series
mean	20	100
S.D.	15	20

Coefficient of correlation between X and Y series is +0.8. Find the most probable value of Y, if X is 30 and probable value of X if Y is 90.

7. Find the two-regression equation from the following data and estimate the value of X if Y is 6.

X=	1	2	3	4	5
Y=	2	5	3	8	7

8. In a locality of 1800 families, a sample of 840 families was selected. Of these 840 families, 206 families were found to have a monthly income of Rs. 50 or less. It is desired to estimate how many out of the 18,00 families have a monthly income of Rs. 50 or less. Within what limits would you place estimate?

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