



Reg. No. :

Name :

**First Semester M.C.A. Degree Examination, May 2009
PROBABILITY AND STATISTICS**

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions. **All** questions carry **equal** marks.

(10×4=40 Marks)

1. The probability density function of a random variable X is

$$f(x) = C(1 - x^2) \text{ if } -1 < x < 1 \\ = 0 \text{ otherwise}$$

Find : a) C b) $P\left(\frac{1}{4} < X < \frac{1}{2}\right)$.

2. X follows Binomial distribution with parameters n = 6 and P.

If $9 P[X = 4] = P[X = 2]$ find P.

3. A point X is chosen at random on the line segment (0, 2). What is the probability that the chosen point lies between $\frac{1}{4}$ and $\frac{2}{3}$?

4. Explain weak laws and strong laws of large numbers.

5. Distinguish between correlation and regression.

6. A random sample of size 36 is taken from an infinite population with $\mu = 63$ and variance $\sigma^2 = 81$. Find the probability of getting the sample mean greater than 66.75.

7. Explain null hypothesis, alternate hypothesis, critical region; power of the test.

8. Explain the properties of a good estimator.

9. A random sample of size 10, taken from a normal population $N(\mu, \sigma^2)$ has standard deviation 4. Find a and b such that $P[a \leq \sigma^2 \leq b] = 0.95$.

10. Explain the properties of normal curve and normal distribution.

P.T.O.

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PART – B

Answer **any two** questions from **each** Module.

(6×10=60 Marks)

Module I

11. Out of 800 families with 5 children each, how many would you expect to have
i) 3 boys ii) 5 girls. Assume equal probabilities for boys and girls.
12. Find the mean and variance of Poisson distribution.
13. An urn contains 7 black and 3 white balls. If 5 balls are drawn at random find the frequency function for the number of black balls obtained (i) if the drawings are made with replacement (ii) without replacement.

Module II

14. State and prove central limit theorem.
15. The random variables X and Y have the joint probability density function

$$f(x, y) = \begin{cases} x+y, & 0 < x < 1; 0 < y < 1 \\ 0 & \text{elsewhere,} \end{cases}$$

Determine the correlation coefficient P.

16. The two lines of regression are
 $8x - 10y + 66 = 0$; $40x - 18y - 214 = 0$. The variance of x is 9. Find (i) the mean values of x and y (ii) correlation coefficient between x and y.

Module III

17. A random sample of size 15 taken from $N(\mu, \sigma^2)$ yields $\bar{x} = 3.2$ and $S^2 = 4.24$. Find a 90% confidence interval for μ and σ^2 .
18. A random sample of size 20 from a normal population gives a sample mean of 42 and sample standard deviation 6. Test the hypothesis that the population mean is 44.
19. The mean weekly sales of soap bars was 146.3 bars per store. After an advertising programme the mean weekly sales in 22 stores was increased to 153.7. and showed a standard deviation of 17.2, was the advertising campaign successful.

(10×6=60 Marks)