

Code No: 811AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA I Semester Examinations, April/May - 2019
PROBABILITY AND STATISTICS
Time: 3hrs
Max.Marks:60
Note: This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have a, b, c as sub questions.

PART - A
5 × 4 Marks = 20

- 1.a) State and prove Baye's theorem. [4]
- b) A continuous random variable X has the distribution function

$$F(x) = \begin{cases} 0, & x \leq 1 \\ k(x-1^4), & 1 < x \leq 3 \\ 1, & x > 3 \end{cases}$$
 Determine i) p.d.f. and ii) k . [4]
- c) If a population of size $N = 5$ and if all possible samples of size 2 are drawn from this population, find the finite population correction factor. [4]
- d) Define type I and type II errors. [4]
- e) Find the rank correlation coefficient for the following data: [4]

x :	1	2	3	4	5
y :	5	4	3	2	1

PART - B
5 × 8 Marks = 40

2. A class consists of 6 girls and 10 boys. If a committee of 3 is chosen at random from the class, find the probability that
 - a) 3 boys are selected
 - b) exactly two boys are selected
 - c) at least one boy is selected and
 - d) exactly two girls are selected. [8]

OR

3. State and prove addition theorem of probability. Three students A , B , C are in running race. If A and B have the same probability of winning and each is twice as likely to win as C , find the probability that B or C wins. [8]

- 4.a) If X is a continuous random variable, prove that
 - i) $E(aX + b) = aE(X) + b$ and ii) $Var(aX + b) = a^2 Var(X)$.
- b) The probability density function of a continuous random variable X is

$$f(x) = \begin{cases} \frac{2}{x^3}, & 1 < x < \infty \\ 0, & \text{otherwise} \end{cases}$$
 Find the distribution function $F(x)$. [4+4]

OR

- 5.a) If a Poisson distribution is such that $\frac{3}{2} P(X = 1) = P(X = 3)$, find
 - i) the mean ii) $P(X \geq 1)$ iii) $P(2 \leq X \leq 5)$.

- b) Find the moment generating function of the Poisson distribution. [5+3]

6. A population consists of five numbers 6, 8, 10, 12, 14. If all samples of size 2 are drawn from this population with replacement. Find
- the total number of samples with replacement.
 - the mean and standard deviation of the population and
 - the mean and standard deviation of the sampling distribution of means. [8]

OR

- 7.a) Obtain an unbiased estimator of $\theta = \sigma^2$ for a normal distribution with mean μ and variance σ^2 .
- b) Explain Bayesian estimation. [4+4]
8. The length of life of certain computers is approximately normally distributed with mean 800 hours and standard deviation 40 hours. If a random sample of 30 computers has an average life of 788 hours, test the null hypothesis $\mu = 800$ hours against the alternative that $\mu \neq 800$ hours at
- 4 % and
 - 5% level of significance. [8]

OR

9. The students of two schools were measured for their heights. One school was in the east coast and another was in the west coast where there is a slight difference in weather. The sampling results are as follows.

East Coast: 43 45 48 49 51 51

West Coast: 47 49 51 53 54 55 55 56 57

Find whether there is any impact of weather on height, taking other variables as constant. Test at 5% level of significance. [8]

10. Using the method of least squares, fit a straight line and a second degree parabola to the following data: [8]

x:	0	1	2	3	4
y:	0	1.8	1.3	2.5	6.3

OR

11. Find the correlation coefficient for the following bivariate frequency distribution. [8]

X

Y		21-25	26-30	31-35	36-40	41-45
	21-25	1				
	26-30		3	1		
	31-35		2	5	2	
	36-40			1	4	1
	41-45			1	3	
	46-50					1