R13

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

$$F(x)=\begin{cases} 0\ , x\le 1 \\ k(x-1^4)\ , 1<x\le 3 \\ 1 \quad , \ x>3 \end{cases}$$. 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) $E(aX+b) = a\ E(X)+b$ 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) $P(X\ge 1)$ iii) $P(2\le X\le 5)$.

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
a) the total number of samples with replacement.
b) the mean and standard deviation of the population and
c) 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 $\mu \neq 100$ hours at
a) 4 % and b) 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

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