R15

Code No: 821AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA I Semester Examinations, January - 2018
PROBABILITY AND STATISTICS

Time: 3hrs **Max.Marks:75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

5 × 5 Marks = 25

1.a) A, B, C in order toss a coin. The first one to toss head wins the game. What are the probabilities of winning, assuming that the game may continue indefinitely? [5]
b) If X is uniformly distributed in $-2 \leq X \leq 2$, find $P(X<1)$. [5]
c) Explain about sampling distribution. [5]
d) Discuss the test of significance procedure. [5]
e) Write the formula to find the rank correlation, by defining the terms involved in it. [5]

PART - B

5 × 10 Marks = 50

2.a) A can hit a target once in five shots. B can hit a target twice in 3 shots. C can hit a target once in 4 shots. What is the probability that 2 shots hit the target?
b) If $P(A) = 2/3$, $P(B) = 1/5$, prove that $0 \leq P(A \cap B) \leq \frac{1}{5}$. [5+5]

OR

3.a) If $P(A) = P(B) = P(A \cap B)$, prove that $P(A \cap \overline{B} + \overline{A} \cap B) = 0$.
b) There are three identical coins, one of which is ideal and the other two are biased with probabilities $\frac{1}{4}$ and $\frac{3}{4}$, respectively for getting a head. One coin is taken at random and tossed twice. If a head appears both the times, show that the probability that the ideal coin was chosen is equal to $\frac{2}{7}$. [5+5]

4.a) Out of 800 families with 5 children each, How many would you expect to have a
i) 3 boys ii) at least one boy iii) either 2 or 2 boys.
b) Suppose the weights of 800 male students are normally distributed with mean 28.8 kg and standard deviation of 2.06 kg. Find the number of students whose weights are
i) between 28.4 kg and 30.4 kg ii) more than 31.3 kg. [5+5]

OR

5. Let X be a random variable such that
$P(X = -2) = P(X = -1) = P(X = 1) = P(X = 2)$ and $P(X < 0) = P(X = 0) = P(X > 0)$
Determine the probability mass function and the distribution of X. [10]

6.a) The mean voltage of a battery is 15 and standard deviation 0.2. Find the probability that four such batteries connected in series will have a combined voltage of 60.8 or more volts.

b) Suppose the diameter of motor shafts in a lot have a mean of 0.249 inches and standard deviation if 0.003 inches. The inner dia of bearings in another lot have a mean of 0.255 inches and standard deviation of 0.002 inches. If a shaft and bearing are selected at random, find the probability that the shaft will not fit inside the bearing. Assume that both dimensions are normally distributed. [5+5]

OR

7.a) A random sample of size 81 is taken from an infinite population having the mean 65 and standard deviation 10. What is the probability that $\bar{X}$ will lie between 66 and 68?

b) Determine the expected number of random samples having their means i) between 22.39 and 22.41 ii) greater than 22.42 iii) less than 22.37 for the sampling distribution of means of 300 random samples each of size n= 36 are drawn from the population of N=1500 which is normally distributed with mean μ = 1500 and σ=0.048. [5+5]

8.a) The nine items of a sample had values 45,47,50,52,48,47,49,53,and 51. Does the mean of the nine items differ significantly from the assumed population mean of 47.57.

b) A survey of 320 families with 5 children each revealed the following distribution

No. of boys	5	4	3	2	1	0
No. of girls	0	1	2	3	4	5
No. of families	14	56	110	88	40	12

Is this result consistent with the hypothesis that male and female births are equally. [5+5]

OR

9.a) Discuss the properties of a good estimator.

b) A random sample of 20 fuses subjected to overload has mean time for blow of 10.63 minutes with standard deviation 2.48 minutes. What can we assert with 95% confidence about the maximum error if we use $\bar{x}$=10.63 minutes as a point estimate of true average it takes such fuses for blow when subjected to overload. [5+5]

10.a) Find the parabola of the form $y = a + bx + cx^2$ which fits most closely with the observations

x	2	4	6	8	10
y	3.07	12.85	31.47	57.38	91.29

b) Find the curve of best fit of the type $y = ae^{bx}$ to the following data by the method of least squares [5+5]

x	1	5	7	9	12
y	10	15	12	15	21

OR

11. Given that the lines of regression of y on x and x on y are respectively $y = x$ and $4x - y = 3$ and the variance of $x = 3$, find:
a) Mean values of x and y
b) Coefficient of correlation
c) Variance on y. [10]

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