Code No: 841AD

R17

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) If A and B are mutually exclusive events such that $P(A) = 4 P(B)$ and $A \cup B = S$. Find:
   i) $P(A \cap B^c)$ ii) $P(A \cap B)$ [5]

b) If X is a continuous random variable and $Y = aX + b$, then prove that
   i) $E(Y) = a E(X) + b$ ii) $V(Y) = a^2 V(X)$ [5]

c) A sample of size 81 was taken whose variance is 20.25 and mean 32. Construct 95%
   confidence interval for the mean.   [5]

d) Define type I and type II errors.   [5]

e) The equations of two Regression lines are $7x - 16 y + 9 = 0$, $5y - 4x - 3 = 0$. Find the
   Coefficient of Correlation and the means of x and y.   [5]

PART - B

5 × 10 Marks = 50

2.a) The Probabilities that students A, B, C and D solve a problem are $\frac{1}{3}, \frac{2}{5}, \frac{1}{5} and \frac{1}{4}$
   respectively. If all of them try to solve the problem what is the probability that the
   problem is solved.

b) Three machines I, II and III produce respectively 40%, 30% and 30% of the total number
   of items of a factory. The percentage of defective items of these machines are 4%, 2%
   and 3% respectively. An item is selected at random and found to be defective. Find the
   probability that it is from
   i) Machine- I   ii) Machine-II   iii) Machine-III.   [5+5]

OR

3.a) Three light bulbs are chosen at random from 12 bulbs of which 5 are defective. Find the
   probability that
   i) All are defective   ii) One is defective   iii) Two are defective

b) Three machines I, II and III produce 20%, 30% and 50% of the total number of items of a
   factory. The percentages of defective items of these machines are 6%, 2% and 5%. An
   item is selected at random and found to be defective. Find the probability that it is from
   i) Machine- I   ii) Machine-II   iii) Machine-III.   [5+5]

4.a) A continuous Random variable has the p.d.f $f(x) = \begin{cases} K(1-x^2), & 1 \le x \le 4 \\ 0 & else\ where \end{cases}$

Determine: i) K   ii) the mean   iii) variance.

  b) 20 % of items from a factory are defective. Find the probability that in a sample of 5
     i) None   ii) At least one   iii) more than one and less than 4, are defective.   [5+5]

OR

5.a) Average number of accidents on any day on a national highway is 1.6. Determine the probability that the number of accidents is i) At least one   ii) At the most.

  b) In a sample of 1000 students who wrote an examination having mean scored is 20 with standard deviation 2.5. Assuming the distribution of marks follows normal, i) how many students score marks between 25 and 30. ii) How many students score more than 15 marks.   [5+5]

6.a) A coin is tossed 10,000 times and it turns up head 5195 times. Discuss whether the coin may be regarded as unbiased one.

  b) In two large populations there are 30% and 25% respectively of fair haired people. Is this difference likely to be hidden in sample of 1200 and 900 respectively from the two populations. Test at 5% level.   [5+5]

OR

7.a) In a random sample of 100 packages shipped by air freight 13 had some damage. Construct 95% confidence interval for the true proportion of damage package.

  b) A sample of 1000 products are examined from a factory and 2.5% found to be defective. Another sample of 1500 similar products are examined and 2% found to be defective. Test the significance between the difference of two proportions at 5% level.   [5+5]

8.a) The medical inspection of a large number of school children revealed an average chest girth of 84.5 cm with a standard deviation of 6.4 cm. In a school students average chest girth of 400 students is 82 cm. Test the significance at 99% level.

  b) A random sample of 1000 men from northern India gives their mean wages to be Rs. 30 per day with a standard deviation of Rs.1.50. A sample of 1500 men from southern India gives a mean wage of Rs. 32 per day with a S.D of Rs.2. Test the significance of the difference between the means.   [5+5]

OR

9.a) A sample of 100 iron bars is said to be drawn from a large number of bars, whose lengths are normally distributed with mean 4 ft and standard deviation.6. If the sample mean is 4.2ft, can the sample be regarded as a truly random sample.

  b) Two independent random samples of sizes 100 and 120 have means 50 and 60 with S.D. of 5 and 6. Construct 95% confidence interval for the difference of two means.   [5+5]

10. Calculate the coefficient of correlation and the two lines of regression between the two variables x and y.   [10]

x	10	12	18	24	23	27
y	13	18	12	25	30	10

OR

11. Fit a curve of the form $y = a\, e^{bx}$ by the method of least squares.   [10]

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62