LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**B.Sc.** DEGREE EXAMINATION – **COMPUTER SCIENCE**

THIRD SEMESTER – **APRIL 2012**

# CS 3204/CA 3201 - STATISTICAL METHODS

 Date : 11-11-20112 Dept. No. Max. : 100 Marks

 Time : 9:00 - 12:00

**PART A (Answer ALL the questions) (10 x 2 = 20)**

1. State any two merits of mean.
2. Milk is sold at the rates of 8, 10, 12, 15 rupees per litre in four different months. Assuming that equal amount are spent on milk by a family in the four months find the average price in rupees per month.
3. Define coefficient of variation.
4. The ranks of some 16 students in Mathematics and Physics are as follows: Two numbers within brackets denote the ranks of the students in Mathematics and Physics (1,1) (2,10) (3,3) (4,4) (5,5) (6,7) (7,2) (8,6) (9,8) (10,11) (11,15) (12,9) (13,14) (14,12) (15,16) (16,13). Calculate the rank correlation coefficient for Proficiencies of this group in Mathematics and Physics.
5. If *A* and *B* are independent events, then prove that $\overbar{A}$ and $\overbar{B}$ are also independent.
6. What is the chance a leap year selected at random will contain 53 Sundays.
7. Let X be a random variable with probability distribution.

|  |  |  |  |
| --- | --- | --- | --- |
| X | -1 | 2 | 3 |
| P(X=x) | 1/6 | 1/2 | 1/3 |

 Find E($X^{2}$).

1. Let X be a continuous random variable with probability density function given by



Find the constant *k*.

1. Prove that .
2. Define Binomial distribution.

**PART B (Answer ALL the questions) (5 x 8 = 40)**

11. (a) (i) The first two samples have 100 items with mean 15 and standard deviation is 3. If the whole group has 250 items with mean 15.6 and standard deviation is . Find the standard deviation of the second group.

(ii) Find median and mode for the following distribution:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Class interval | 0 -10 | 10-20 | 20 -30 | 30 -40  | 40- 50 | 50 -60 | 60 -70 | 70 -80 |
| Frequency | 5 | 8 | 7 | 12 | 28 | 20 | 10 | 10 |

 (OR)

 (b) Obtain the rank correlation coefficient for the following data:

X: 65 66 67 67 68 69 70 72

 Y: 67 68 65 68 72 72 69 71

12. (a) In a partially destroyed laboratory record of an analysis of correlation the following results only are legible. Variance of X = 9 Regression equations:

8 X – 10 Y + 66 = 0. 40 X – 18 Y = 214.What are (i) the mean values of X and Y (ii) The correlation coefficient between X and Y (iii) The standard deviation of Y?

(OR)

 (b) Two sample polls of votes for two candidates A and B for a public office are taken, one from among the residents of rural areas. The results are given in adjoining table. Examine whether the nature of the area is related to voting preference in this election

|  |
| --- |
| Votes for |
| Area | A | B | Total |
| Rural | 620 | 380 | 1000 |
| Urban | 550 | 450 | 1000 |
| Total | 1170 | 830 | 2000 |

(χ 2 0.05 for 1, 3, 4, 5 d.f are 3.841, 7.815, 9.485, 11.07 respectively).

13. (a) A and B throw alternatively with a pair of balanced dice. A wins if he throws a sum of six points before B throws a sum of seven points, while B wins if he throws a sum of seven points before A throws a sum of six points. If A begins the game, show that this probability of winning is 30/61.

(OR)

The probabilities of X, Y and Z becoming managers are $\frac{4}{9}, \frac{2}{9}$ and $\frac{1}{3}$ respectively.

The probabilities that the Bonus Scheme will be introduced if X, Y and Z becomes managers are $\frac{3}{10},\frac{1}{2}$ and $\frac{4}{5}$ respectively. (i) What is the probability that Bonus Scheme will be introduced, and (ii) if the Bonus Scheme has been introduced, what is the probability that the manager appointed was X?

14. (a) A random variable X is distributed at random between the values 0 and 1 so that

its probability density function is $f\left(x\right)=kx^{2}(1-x^{3})$, where k is a constant. Find the value of *k*, find its mean and variance.

(OR)

(b) The joint probability distribution of two random variables X and Y is given by:

 $P\left(X=1,Y=1\right)=\frac{1}{3}, P\left(X=1,Y=1\right)=\frac{1}{3}$ and $P\left(X=1,Y=1\right)=\frac{1}{3}$.

Find (i) Marginal distributions of X and Y, and (ii) the conditional probability

distribution of X given Y=1.

15. (a) Find the moment generating function of the Binomial distribution and hence

find its mean and variance.

(OR)

 (b) Find the moment generating function of the exponential distribution and hence

 find its mean and variance.

**PART C (Answer any TWO questions) (2 x 20 = 40)**

16. (a) An incomplete frequency distribution is given as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Frequency | Variable | Frequency |
| 10 – 20 | 12 | 50 – 60 | ? |
| 20 – 30 | 30 | 60 – 70 | 25 |
| 30 – 40 | ? | 70 – 80 | 18 |
| 40 – 50 | 65 | Total | 229 |

 Given that the median value is 46. Determine the missing frequencies using median

 formula.

(b) Calculate (i) Quartile deviation (Q .D) and (ii) Mean Deviation (M.D) from median for following data:

Marks : 0-10 10-20 20-30 30-40 40-50 50-60 60-70

No of students: 6 15 8 15 7 6 3. (10+10)

17. (a) State and prove Baye’s theorem

 (b) State and prove the addition theorem of probability.

 (12+8)

 18. (a) Two random variables X and Y have the following joint probability density

 function :$f\left(x,y\right)=\left\{\begin{matrix}2-x-y, 0\leq x\leq 1, 0\leq y\leq 1\\0, Otherwise \end{matrix}\right.$

Find (i) Marginal density functions of X and Y.

(ii) Conditional density functions (iii) Var (X), Var (Y) and

(iv) Covariance between X and Y.

 (b) If X is a Poisson variate such that P (X = 2) = 9 P (X = 4) + 90 P (X = 6) then

 find the mean**.**

(15+5)

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