LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – NOVEMBER 2007

CS 3204 / 3201/4200 - STATISTICAL METHODS

AK 20

Date : 05/11/2007 Dept. No. Max. : 100 Marks
Time : 9:00 - 12:00

PART A

(Answer ALL the questions) **(10 X 2 = 20)**

1. Find the arithmetic mean of the following frequency distribution:

x :	1	2	3	4	5	6	7
f :	5	9	12	17	14	10	6

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. 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.

4. Test the hypothesis that σ =10 given S = 15 for a random sample of size 50 from a normal population.

5. If A and B are independent events, then prove that $\overline{A}$ and $\overline{B}$ are also independent.
6. What is the chance a leap year selected at random will contain 53 Sundays.

7. A random variable X has the following probability function:

X	0	1	2	3	4
P (X=x)	0	k	2k	2k	4k

Find E (X).
8. Check whether the continuous random variable X with the function $f(x)=6x(1-x), 0 \le x \le 1$ is a probability density function.
9. The mean and variance of a binomial distribution are 4 and $\frac{4}{3}$ respectively. Find $P(X \ge 1)$.
10. Define Uniform Distribution.

PART B

(Answer ALL the questions) **(5 X 8 = 40)**

11. (a) The Geometric mean of 10 observations on a certain variable was calculated as 16.2. It was discovered that one of the observations was wrongly recorded as 12.9. In fact that it was 21.9. Apply appropriate correction and calculate the correct geometric mean.

(**OR**)

(b) 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 $\sqrt{13.44}$. Find the standard deviation of the second group.

12. (a) Obtain the rank correlation coefficient for the following data;

X:	68	64	75	50	64	80	75	40	55	64
Y:	62	58	68	45	81	60	68	48	50	70

(OR)

(b) A sample analysis of examination results of 200 MBA 's was made. It was found that 46 students had failed, 68 secured III division, 62 secured II division, and the rest were placed in I division. Are these figures commensurate with a general examination result which is in the ratio 4: 3: 2: 1 for various categories respectively? ($\chi^2_{0.05}$ for 3, 4, 5 d.f are 7.815, 9.485, 11.07).

13. (a). State and prove addition theorem of probability.

(**OR**)

(b). From a city population, the probability of selecting (i) a male or a smoker is 7/10, (ii) a male smoker is 2/5, and (iii) a male, if a smoker is already selected is 2/3. Find the probability of selecting (a) a non-smoker, (b) a male, and (c) a smoker, if a male is first selected.

14. (a). A random variable X is distributed at random between the values 0 and 1 so that its probability density function is $f(x)=kx^2(1-x^3)$, where k is a constant. Find the value of (i) k (ii) mean and (iii) variance.

(**OR**)

(b). If X and Y are two random variables having joined density function

$$f(x,y)=\begin{cases}\frac{1}{8}(6-x-y); & 0 \le x < 2;\ 2 \le y < 4\\ 0 & \text{otherwise}\end{cases}$$

Find (i) $P(X < 1 \cap Y < 3)$

(ii) $P(X + Y < 3)$

(iii) $P(X < 1 / Y < 3)$

15. (a). X is a Poisson variate such that (i)If P (X = 2) = 3 P (X = 3), find P (X = 4).
(ii) If P (X = 2) = 9 P (X = 4) + 90 P (X = 6) find the mean. **(3 + 5)**

(**OR**)

(b). Find the moment generating function of the Binomial distribution and hence find its mean and variance.

PART C

(Answer any TWO questions) **(2 X 20 = 40)**

16. (a) Calculate (i) Quartile deviation (Q .D) and (ii) Mean Deviation (M.D) from mean 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 .

(b) 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? **(10+10)**

17. (i) State and prove Baye's theorem
(ii) 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**.**

(10+10)

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

$$\text{function: } f(x,y)=\begin{cases}k(4-x-y); & 0 \le x \le 2; 0 \le y \le 2\\ 0, & \textit{otherwise}\end{cases}$$

Find (a) the constant k (b) marginal density functions of X and Y.
(c) Conditional density functions and (d)Var(X), Var(Y), Cov(X,Y).

(ii) Find the moment generating function of the exponential distribution and hence find its mean and variance. **(12+8)**

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