LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – NOVEMBER 2011

CS 3204/CA 3201 - STATISTICAL METHODS

Date : 11-11-2011   Dept. No.   Max. : 100 Marks
Time : 9:00 - 12:00

PART A

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

1. A cyclist pedals from his house to his college at a speed of 10 m.p.h. and back from college to his house at 15 m.p.h. Find the average speed.
2. Define coefficient of variation.
3. State Pearson's β coefficients.
4. State any two properties of regression coefficients.
5. If A and B are independent events, then prove that $\bar{A}$ and $\bar{B}$ 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 normal distribution.

PART B

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

11. (a) Calculate Quartile deviation (Q .D) 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

                                    (OR)

   (b) The first four moments of a distribution about the value 4 of the variable are -1.5, 17, -30 and 108. Find the moments about the mean, β_1 and β_2.

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

    X: 65   66   67   67   68   69   70   72
    Y: 67   68   65   68   72   72   69   71

(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 respectively are 7.815, 9.485, 11.07).

13. (a) From a city population, the probability of selecting a male or a smoker is

7/10, a male smoker is 2/5, and a male, if a smoker is already selected is 2/3. Find the probability of

selecting (i) a non-smoker, (ii) a male, and (iii) a smoker, if a male is first selected.

(**OR**)

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

14. (a) A random variable X has the following probability function

Values of X: 0   1   2   3   4   5   6   7

p(x)   0   k   2k   2k   3k k^2 $2k^2$ $7k^2 + k$

(i) Find k (ii) Evaluate $P(X < 6)$, $P(X \geq 6)$ (iii) Determine the distribution function of X.

(OR)

(b) A random variable X is distributed at random between the values 0 and 4 so that   its   probability density function is $f(x) = kx^3 (4 - x)^2$, where k is a constant. Find the value of k, find its mean and variance.

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) A number of particular articles have been classified according to their weights. After drying for 2weeks the same articles have been again been weighted and similarly classified. It is known that the median weight in the first weighing was 20.83 gm, while in the second weighing it was 17.35 gm. Some frequencies a and b in the first weighing and x and y in the second are missing. It is known that a = x/3 and b = y/2. Find the values of the missing frequencies.

Frequencies for weighing			Frequencies for weighing		
Class	I	II	Class	I	II
0 – 5	a	x	15 – 20	52	50
5 – 10	b	y	20 – 25	75	30
10 – 15	11	40	25 – 30	22	28

(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? **(12+8)**

17. (i) State and prove Baye's theorem
    (ii) A, B and C play a game and the chances of their winning it in an attempt are 2/3, 1/2 and 1/4 respectively. A has the first chance, followed by B and then by C. This cycle is repeated till one of them wins the game. Find the respective chances of winning the game. **(10+10)**

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

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

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 Poisson distribution.

(15+5)

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