[This question paper contains 5 printed pages.]

6594 *Your Roll No.* .....

B

B.Sc. (Hons.) COMPUTER SCIENCE / III Sem.

Paper CS-304 : STATISTICS

(Admissions of 2001 and onwards)

Time : 3 Hours *Maximum Marks : 75*

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt **all** *questions.*
All *questions carry equal marks.*
Parts of the questions must be attempted together. Use of scientific calculator and statistical tables is allowed.

1. For a set of 250 observations on a certain variable, the mean and standard deviation are respectively 65.7 and 4.4. However, it is later found that two observations which should be correctly read as 71 and 83, had been wrongly recorded as 31 and 80. Obtain the correct values of mean and S.D.

2. Let there be two set of value of x with n_1 and n_2 values and let $\bar{x}_1$ and $\bar{x}_2$ be their means and s_1, s_2 be

P.T.O.

their standard deviations. Show that combined variance of two sets pooled together is

$$s^2 = \frac{n_1 s_1^2 + n_2 s_2^2}{n_1 + n_2} + \frac{n_1(\bar{x}_1 - \bar{x})^2 + n_2(\bar{x}_2 - \bar{x})^2}{n_1 + n_2}$$

where $\bar{x} = (n_1\bar{x}_1 + n_2\bar{x}_2)/(n_1 + n_2)$

3. From the following data obtain first four central moments and hence obtain coefficient of skewness and kurtosis. Comment upon the nature of distribution.

C.I. :	0-10	10-20	20-30	30-40
Freq. :	1	3	4	2

4. Calculate Bowley's coefficient of skewness from the following data :

Variable :	0-10	10-20	20-30	30-40	40-50	50-60	more than 60
Frequency :	12	28	50	66	18	16	10

5. For 20 army personnel, regression of weight of kidneys (y) on weight of heart (x), both measured in grams is

$$y = 0.399x + 6.934$$

and the regression of weight of heart on weight of kidneys is

$$x = 1.212y + 2.461$$

Find the correlation between two variables and also their means.

6. Obtain rhe Spearman's rank correlation coefficient for the following data :

X : 48, 33, 40, 9, 16, 16, 65, 24, 16, 57

Y : 13, 13, 24, 6, 15, 4, 20, 9, 6, 19

7. (a) Given $r_{12} = 0.863$, $r_{13} = 0.648$ and $r_{23} = 0.709$. Find $r_{12.3}$ and $r_{1.23}$.

(b) Is it possible to get the following from a set of experimental data :

$r_{12} = 0.6$, $r_{23} = 0.8$, $r_{31} = -0.5$?

8. Given the two random variables x and y which have the joint density

$$f(x, y) = \begin{cases} xe^{-x(1+y)} & \text{for } x > 0 \text{ and } y > 0 \\ 0 & \text{elsewhere} \end{cases}$$

find the regression equation of y on x.

9. Define Lognormal Distribution for a continuous random variable. The life in thousands of miles, of a certain type of electronic control of locomotives has an approximately lognormal distribution with $\mu = 5.149$ and $\sigma = 0.737$. Find the 5^{th} percentile of life of such a locomotive.

P.T.O.

10. The amount of time that a bank manager spends on a customer is a normally distributed R.V. with a mean $\mu = 3.2$ min. and $\sigma = 1.6$ minutes. If a random sample of 64 customers is observed, find the probability that their mean time with the manager is at least 3.2 minutes but less than 3.4 minutes.

11. Two random samples were drawn from two normal populations and their values are :

A : 64 66 74 78 82 85 87 92 93 95 97

B : 66 67 75 76 82 84 88 90 92

Test whether the two populations have same variance at 5% level of significance. ($F = 3.36$ at 5% level for $v_1 = 10$ and $v_2 = 8$).

12. If $X_1, X_2, \ldots, X_n$ constitute a random sample of size n from a normal population with mean μ and known variance σ^2, find maximum likelihood estimator for μ.

13. If $S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$ is the variance of a random sample from anp infinite population with the finite variance σ^2, then prove that S^2 is an unbiased estimator of parameter σ^2. Is it consistent also ?

14. In 16 one-hour test runs, the gasoline consumption of an engine averaged 16.4 gallons with a standard deviation of 2.1 gallons. Test the claim that the average gasoline consumption of this engine is 12.0 gallons per hour. (Given $t_{15,0.05} = 1.753$)

15. Consider the following table obtained in a study of the relationship, if any, of the IQ's of persons who have gone through a large company's job-training program and their subsequent performance on the job :

		Performance			
		Poor	Fair	Good	
IQ	Below Average	67	64	25	156
	Average	42	76	56	174
	Above Average	10	23	37	70
		119	163	118	400

Test the null hypothesis that on the job performance of persons who have gone through training program is independent of their I.Q.

(Given $\chi^2_{4,0.05} = 9.488$)