Reg. No. : | | | | | | | | | | | |

Question Paper Code : Z 8431

B.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Fourth Semester

Computer Technology

BCS 241 — PROBABILITY OF STATISTICS

(Common to B.Sc. Information Technology)

(Regulation 2003)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Baye's theorem of probability.

2. Define moment generating function of discrete and continuous random variable about the origin.

3. Give the mean and standard deviation of a binomial distribution.

4. Write down any four properties of a normal curve.

5. What is meant by standard error?

6. Define null and alternative hypothesis.

7. What is scatter diagram?

8. What are the conditions under which two regression lines (a) are parallel and (b) are perpendicular to each other?

9. What is Randomised Block design?

10. Write down the skeleton of ANOVA table.

PART B — (5 × 16 = 80 marks)

11. (a) In a bolt factory machines A, B, C manufacture respectively 25,35 and 40 percent of the total. Of their output 5,4 and 2 percent are defective bolts respectively. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that was manufactured by machines A, B or C? (16)

Or

(b) (i) X is a random variable whose density function is

$$f(x)=\begin{cases} Ae^{-x}, & 0<x<\infty \\ 0, & \text{otherwise} \end{cases}.$$

Find the value of

(1) A.

(2) Means of X.

(3) Variance of X.

(4) Third moment about the mean. (8)

(ii) A random variable X has density function given by

$$f(x)=\begin{cases} 2e^{-2x}, & x\geq 0 \\ 0, & x<0 \end{cases}.$$

Obtain m.g.f. and the first four moments about the origin. (8)

12. (a) (i) Define Poisson distribution and find its mean and variance. (8)

(ii) If X is uniformly distributed over (0,10), find the probability that

(1) $X<2$ (2) $X>8$ (3) $3<X<9$. (8)

Or

(b) (i) The daily consumption of bread in a hostel, in excess of 2000 loaves is approximately Gamma distributed with parameters $\alpha=2$ and $\beta=1000$. The hostel has a daily stock of 3000 loaves. What is the probability that the stock is insufficient on a day? (8)

(ii) The mean weight of 500 students is 151 lb and the standard deviation is 15 lb. Assuming that the weights are normally distributed, find how many students weigh between 120 and 155 lb. (8)

13. (a) (i) In a city, a sample of 1000 people were taken and out of them 540 are vegetarians and the rest are non-vegetarians. Can we say that both habits of eating are equally popular in the city at

(1) 1% level of significance.

(2) 5% level of significance. (8)

(ii) The means of two large samples of sizes 2000 and 1000 are 68.0 and 67.5 gm respectively. Can the sample be regarded as drawn from the same population of standard deviation 2.25 gm? (8)

Or

(b) (i) Two random samples of 11 and 9 items show the sample standard deviations of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test the hypothesis that the true variances are equal. (8)

(ii) In an investigation into the health and nutrition of two groups of children of different social status, the following results are got. (8)

Social status / Healths	Poor	Rich	Total
Below Normal	130	20	150
Normal	102	108	210
Above Normal	2[illegible]	96	120
Total	25[illegible]	224	480

Discuss the relation between the health and their social status.

14. (a) (i) In a partially destroyed record, the following data are legible :

Variance of X = 25.

Regression equation of X on Y is $5X - Y = 22$ and

Regression equation of Y on X is $64X - 45Y = 24$.

Find (1) Mean values of X and Y.

(2) Coefficient of correlation between X and Y.

(3) Standard deviation of Y. (8)

(ii) Calculate the coefficient of correlation for the following data : (8)

X :	9	8	7	6	5	4	3	2	1
Y :	15	16	14	13	11	12	10	8	9

Or

(b) The following table gives the age (X) in years of cars and annual maintenance cost (Y) in thousands of Rupees.

X:	1	2	3	4	5	6	7	8	9
Y:	9	8	10	12	11	13	14	16	15

Estimate the maintenance cost for a 10 year old car after finding the suitable regression equation. (16)

15. (a) Three machines A, B, C gave the production of pieces in four days as below. Is there a significant difference between machines? (16)

A	17	16	14	13
B	15	12	19	18
C	20	8	11	17

Or

(b) An agriculturist wants to test the effects of four different fertilizers A, B, C and D on the yield of paddy. In order to eliminate sources of error due to variability in self-fertility, he used the fertilizers in a Latin square arrangements given below where the numbers indicate yields in quintals per unit area. Perform an analysis of variance to decide whether there is a difference between the fertilizers at 5% level of significance. (16)

A 18	C 21	[illegible]	B 11
D 22	B [illegible]	[illegible]	C 19
B 15	A 20	C 23	D 24
C 22	[illegible]	B 10	A 17