

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 6079 **G**

Unique Paper Code : 62357503

Name of the Paper : DSE – Statistics

Name of the Course : CBCS B.A. (PROG)

Semester : V

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any two parts from each question.
3. All questions are compulsory.
4. Calculator is allowed.

P.T.O.

1. (a) Prove

$$(i) P(A \cap B) \geq P(A) + P(B) - 1.$$

$$(ii) P(B)P(A|B) + P(B^c)P(A|B^c) = P(A).$$

(3+3.5)

(b) Three students independently attempt a problem.

Their chances of success are $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ respectively.

Find the probability that the problem get solved.

(6.5)

(c) An insurance company insures 2000 scooter, 4000

car and 6000 truck drivers. The probability of an

accident involving a scooter, a car and a truck is

$\frac{1}{100}$, $\frac{3}{100}$ and $\frac{3}{20}$ respectively. If one of the

insured persons meets with an accident, what is

the probability that he is a truck driver?

(6.5)

2. (a) In the experiment of tossing 2 dice, let X be the absolute difference of scores. Obtain $E(X)$.

(6)

(b) Let $Y = aX + b$ Prove

(i) $V(Y) = a^2V(X)$

(ii) $M_Y(t) = e^{bt}M_X(at)$ (3+3)

- (c) Let X be a continuous random variable with probability density function

$$f(x) = \begin{cases} cx^2, & 0 \leq x \leq 2, \\ 0, & \text{elsewhere} \end{cases}$$

Find (i) the value of c , (ii) The first three moments about origin. (2+4)

3. (a) If X is a Poisson variate such that $P(X = 1) = 2P(X = 2)$. Find (i) the mean (ii) $P(X = 0)$.

(4+2.5)

- (b) If 70% of all urban men are drinkers, find the probability that a group of 5 urban men has :

(i) exactly one drinker

(ii) at most two drinkers.

(3+3.5)

- (c) The PCL of patients is normally distributed with mean 200 and standard deviation 40. What is the probability that the PCL of a randomly chosen patient is (i) at most 280 (ii) between 250 & 300.

(3+3.5)

4. (a) If X and Y have joint density

$$f(x,y) = \begin{cases} c(x+y), & 0 \leq x \leq 1, 0 \leq y \leq 2 \\ 0 & \text{elsewhere} \end{cases}$$

Find (i) the value of c (ii) the marginal density of Y (iii) $P(0 \leq Y \leq 1)$. (2+2.5+2)

(b) The hardness of pins has a mean value of 50 with a S.D. of 1.2. What is the probability that the mean hardness for a random sample of 40 pins is at least 51. (6.5)

(c) Prove that $r(aX + b, cY + d) = r(X, Y)$ if $a > 0$, $c > 0$, where $r(X, Y)$ denotes the correlation coefficient between X and Y . (6.5)

5. (a) A wholesaler in apples claims that only 5% of his stock is defective. A random sample of 600 apples from his stock contained 36 defective apples. Test the claim of the wholesaler. (6)

(b) Ten men are randomly chosen from a population, and their heights in inches are found to be :

63, 63, 64, 66, 67, 68, 69, 70, 71, 71

Test whether the mean height of the population is 66 inches. (Given $t(0.05)$ for 9df is 2.262).

(6)

(c) The following table gives the number of road accidents which occurred during the various days of a randomly chosen week :

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Number of Road accidents	14	16	8	19	11	9	14

Examine whether accidents are uniformly distributed over this week. (Given $\chi^2(0.05)$ for 6df is 12.6). (6)

6. (a) A random sample of 100 students gave a mean weight of 58 kg with S.D. of 4 kg. Test the hypothesis that the mean weight of the population is 60 kg. (6)

- (b) Nine patients to whom a certain drug was administered yielded the following increments in blood pressure :

7, 3, -1, 4, -3, 5, 6, -4, 1

Discuss whether this data indicates that the drug was responsible for these increments in blood pressure. (Given $t(0.05)$ for 8df is 1.86) (6)

(c) In an experiment on immunization of goats from anthrax, the following results were obtained :

	Died of anthrax	Survived
Inoculated	2	10
Not inoculated	6	6

Test whether the inoculation was effective. (Given $\chi^2(0.05)$ for 1df is 3.84)