

Total No. of Questions : 8]

SEAT No. :

P-1593

[Total No. of Pages : 4

[6002]-223

S.E. (A.I.D.S)

STATISTICS

(2019 Pattern) (Semester-IV) (217528)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data, if necessary.

Q1) a) The following marks have been obtained by a class of students in 2 papers of mathematics. [9]

Paper I	45	55	56	58	60	65	68	70	75	80	85
Paper II	56	50	48	60	62	64	65	70	74	82	90

Calculate the coefficient of correlation for the above data.

b) Find the quartile deviation and coefficient of quartile deviation of the following frequency distribution. [9]

Marks	≤10	10-20	20-30	30-40	40-50	50-60
No. of Students	10	20	30	50	40	30

OR

Q2) a) Determine the eq^{ns} of regression lines for the following data. Also find the value of (i) y for $x = 4.5$ (ii) x when $y = 13$ [9]

x	2	3	5	7	9	10	12	15
y	2	5	8	10	12	14	15	16

b) The first four moments of four distribution about the value 4 are 2, 20, 40 and 100 respectively. [9]

- i) Obtain the first central moments
- ii) Find mean, standard deviation
- iii) Find coefficients of skewness and kurtosis

P.T.O.

Q3) a) In a certain company install 2000 LED bulbs on each floor. If LED bulbs have average life of 1000 burning hours with standard deviation of 200 hours. Using normal distribution find what number of LED bulbs might be expected to Fail in 700 hours. [6]

(Given : $P(0 < z < 1.5) = 0.4332$)

b) Between 2 pm to 4 pm the average no of phone calls per minute coming into a switch board of a company is 2.5. Find the probability that during a particular minute there will be [5]

- i) no phone call
- ii) exactly 3 phone calls

c) A dice is thrown 10 times. If getting an odd number is a success. What is the probability of i) 8 success ii) At least 6 success [6]

OR

Q4) a) Weights of 4000 students are found to be normally distributed with mean 50 kg and standard deviation 5 kgs. Find the number of students with weights i) less than 45 kgs ii) between 45 to 60 kgs

(for standard normal distribution z , area under the curve between $z = 0$ to $z = 1$ is 0.3413 and that between $z = 0$ to $z = 2$ is 0.4772) [6]

b) If 10% bolts produced by a machine are defective. Determine the probability that out of 10 bolts chosen at random. [5]

- i) two will be defective
- ii) at most two will be defective.

c) In a continuous distribution density function $f(x) = kx(2 - x)$, $0 < x < 2$. Find the value of k , mean and variance. [6]

Q5) a) Random sample of 400 men and 600 women were asked whether they would have a school near their residence 200 men and 325 women were in favour of proposal. Test the hypothesis that the proportion of men and women in front of proposal is same at 5% level of significance. (Given $Z_{\alpha} = 1.96$ at 5% l.o.s) [6]

b) The values given below are

- i) Observed frequencies of a distribution
- ii) The frequencies of a normal distribution having same mean, standard deviation and the total frequency as in a) apply χ^2 test of godness of fit.

a)	1	5	20	28	42	22	15	5	2
b)	1	6	18	25	40	25	18	6	1

(Given $\chi^2 = 12.592$ at 5% l.o.s.) [6]

- c) Fertilizers A and B are tried respectively on 10 and 8 randomly chosen experimental plots. The yields in the plots were as given below. Test using t-test whether in effects of the fertilizer as reflected in the mean yields. [6]

Fertilizers	Yields									
A	8.0	7.6	8.2	7.8	8.3	8.4	8.2	7.8	7.1	8.0
B	7.4	8.1	7.6	8.1	7.5	7.6	7.3	7.2	-	-

(Given $t_{0.05} = 2.201$ at d.o.f 16)

OR

- Q6) a) The average marks in mathematics of a sample of 100 students was 51 with S.D. of 6 marks. Could this have a random sample from the population with average marks 50? [6]

(Given $z_{\alpha} = 1.96$ at 5% l.o.s.)

- b) A coin is tossed 160 times and following are expected and observed frequencies for number of heads.

No of heads	0	1	2	3	4
Expected frequency	17	52	54	31	6
Observed frequency	10	40	60	40	10

Find the χ^2 value. [6]

- c) In two independent samples of size 8 and 10 the sum of squares deviations of the values from the respective sample means were 84.4 and 102.6. Test whether the difference of variances of the population is significant or not. [6]

(Given $F_{0.05} = 3.29$ at degrees of freedom (7,9))

- Q7) a) State and prove Neyman-pearson Fundamental lemma. [9]

- b) Let p is the probability that a given die shows even number. To test

$H_0: P = \frac{1}{2}$ Vs $H_1: P = \frac{1}{3}$ following procedure is adopted. Toss the die twice and accept H_0 if both times. It shows even number. Find the probabilities of Type I and Type II error. [8]

OR

Q8) a) For distribution

[9]

$$df = \begin{cases} \beta e^{-\beta(x-\gamma)} dx, & x \geq \gamma \\ 0 & x < \gamma \end{cases}$$

Show that for $H_0 : \beta = \beta_0 = \gamma = \gamma_0$ and $H_1 : \beta = \beta_1 = \gamma = \gamma_1$ is the best critical region is given by

$$\bar{x} = \frac{1}{\beta - \beta_0} \left\{ \gamma_1 \beta_1 - \gamma_0 \beta_0 - \frac{1}{n} \log k + \log \frac{\beta_1}{\beta_0} \right\}$$

b) Write short notes on :

[8]

- i) Critical region and Most powerful critical region.
- ii) Level of significance and power of Test.
