

Total No. of Questions : 8]

SEAT No. :

PD-4086

[Total No. of Pages : 4

[6402]-46

S.E. (Artificial Intelligence and Data Science)

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) Assume suitable data, if necessary.
- 5) Use of calculator is allowed.

Q1) a) The number of I-phones sold by the showroom was recorded for 15 days. Find the [10]

- i) Range and Coefficient of range
 - ii) Quartile deviation and coefficient of Quartile deviation
- For the following discrete distribution

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Freq.	29	14	21	100	26	38	108	19	100	74	69	104	62	92	22

b) Obtain the regression lines y on x and x on y for the data : [8]

X	5	1	10	3	9
Y	10	11	5	10	6

OR

Q2) a) Find the first four moments about any arbitrary point for the following data. [10]

Marks	29	30	31	32	33	34	35	36	37	38	39
No. of Students	2	1	4	5	10	75	50	74	62	15	6

Also find

- i) Four central moments
 - ii) Coefficient of skewness and kurtosis
- b) Compute the coefficient of correlation for the following data. [8]

X	10	14	18	22	26	30
Y	18	12	24	6	30	36

P.T.O.

Q3) a) In a sample of 1000 cases the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal find [6]

- How many students score between 12 and 15?
- How many score below 8?

[Given: $A(z=0.8)=0.2881$, $A(z=0.4)=0.1554$, $A(z=2.4)=0.4918$]

b) An unbiased coin is thrown 10 times. Find the probability that [5]

- getting exactly 6 heads.
- Getting at least 6 heads.

c) If the probability that an individual suffers a bad reaction from a certain injection is 0.001. Determine the probability that out of 2000 individuals [6]

- Exactly 3 will suffer a bad reaction.
- At most 1 will suffer a bad reaction

OR

Q4) a) A random variable X the following probability distribution [6]

X	1	2	3	4	5	6	7
P(X)	k	2k	3k	k^2	$k^2 + k$	$2k^2$	$4k^2$

Find :

- k
- $P(x>5)$
- $P(0 \leq x \leq 5)$

b) The number of breakdowns of a computer in a week is a Poisson variable with $m=np=0.3$. What is the probability that the computer will operate [5]

- With no breakdown
- At most one breakdown in a week.

c) Mean and variance of Binomial Distribution are 6 and 2 respectively. [6]

Find

- $P(r=0)$,
- $P(r \leq 1)$

- Q5) a)** A random sample of 16 newcomers gave mean of 1.67m and standard deviation of 0.16m. The mean height of the students of the previous year known to be 1.600m. At 5% significance level is the mean height of the newcomers significantly different from the mean height of the students population of the previous years? [6]

[Given $t_{\alpha} = 2.13$]

- b)** From the data given below. Intelligence tests of two groups of boys and girls gave the following results. Examine the difference is significant at 5% level of Significance. [6]

	Mean	S.D.	Size
Girls	70	10	70
Boys	75	22	110

[Given $Z_{\alpha} = 1.96$]

- c)** Following table shows number of books issued, on the various days of the week, from a certain library. At 5% level of significance test the null hypothesis that number of books issued independent of the day. [6]

Day	Mon	Tue	Wed	Thur	Fri	Sat
No.of books issued	120	130	110	115	135	110

[Given $\chi^2_{\alpha} = 11.071$]

OR

- Q6) a)** Find the F-statistics from the following data [6]

Sample	Size(n)	Total Observations	Sum of squares Of observations
1	8	9.6	61.52
2	11	16.5	73.26

- b)** A school does a study about the occurrence of different colored eyes in its pupils. It is hypothesized that 15% of pupils will have green eyes, 25% of pupils will have blue eyes and 60% of pupils will have brown eyes. Of the 1000 pupils, 80 are chosen at random. The results of the sample are as follows. [6]

Green	Blue	Brown
18	28	34

[Given $\chi^2_{\alpha} = 5.99$]

- c)** A manufacturer claims that a special type of projector bulb has an average life 160 hours. To check this claim an investigator takes a sample of 20 such bulbs, puts on the test and obtains an average life 167 hours with standard deviation 16 hours. Assuming that the life time of such bulbs follows normal distribution, does the investigator accept the manufacturer's claim at 5% level of significance? [6]

[Given $t_{\alpha} = 2.093$]

Q7) a) State & Prove Neyman-Pearson Fundamental Lemma. [9]

b) A single observation is drawn from the distribution [8]

$$f(x, \theta) = \begin{cases} \frac{2x}{2\theta + 1} & 0 \leq x \leq \theta + 1 \\ = 0 & \theta \leq \theta + 1 \end{cases}$$

It is required to test $H_0: \theta = 1$ vs $H_1: \theta = 1.5$, H_1 is rejected iff the observation is > 1.7 . Calculate the probability the errors of two kinds.

OR

Q8) a) Write short note on : [9]

i) Critical Region

ii) Most powerful test

iii) Advantages and disadvantages of non-parametric tests

b) Explain in detail likelihood ratio test and the properties of it. [8]

Next sem

SPPUQuestionPapers.com