Printed Page:- 05 **Subject Code**:- **AAS0303**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III - THEORY EXAMINATION (2023 - 2024)

Subject: Statistics and Probability

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 20

1. Attempt all parts:-

1-a. The first three raw moment of distribution are 1,16, -40, then variance of the distribution is (CO1) 1

(a) 16

(b) 15

(c) 3

(d) None of these

1-b. If the regression coefficients are 0.8 and 0.2. What would be the value of coefficient of correlation? (CO1) 1

(a) 0.16

(b) 0.8

(c) 0.3

(d) 0.4

1-c. A variable whose value is determined by the outcome of a random experiment is called (CO2) 1

(a) Random

(b) Random variable

(c) Constant

(d) None of these

1-d. Two unbiased coins are tossed. what is the probability of obtaining both heads 1

(CO2)

(a) $\frac{1}{2}$

(b) $\frac{1}{4}$

(c) $\frac{3}{4}$

(d) None of these

1-e. In Normal Distribution, the shape of curve is (CO3) 1

(a) Flat

(b) Circular

(c) Bell Shaped

(d) Spiked

1-f. If the mean of a Poisson distribution is 9 the variance is equal to (CO3) 1

(a) 3

(b) 9

(c) 6

(d) 81

1-g. ANOVA technique was developed by : (CO4) 1

(a) Gosset

(b) Karl Pearson

(c) R.A. Fisher

(d) Laplace

1-h. Inferential statistics is the (CO4) 1

(a) Process of using a population parameter to estimate the values for sample statistics

(b) Process of using sample statistics to estimate population parameters

(c) Process which allows the researcher to determine the exact values for population parameters

(d) Process that eliminates the problem of sampling error

1-i. On 8^{th} Feb, 2005 it was Tuesday. What was the day of the week on 8^{th} Feb, 2004? (CO5) 1

(a) Tuesday

(b) Monday

(c) Wednesday

(d) Sunday

1-j. A person crosses a 600 m long street in 5 minutes. What is his speed in km per hour? (CO5) 1

(a) 3.6 Km/hr

(b) 10 Km/hr

(c) 8.4 km/hr

(d) 7.2 Km/hr

2. Attempt all parts:-

2.a. Define Median. (CO1) 2

2.b. State multiplication theorem of probability. (CO2) 2

2.c. In a Binomial Distribution, if p = q, then P(X = x) is given by? CO 3 2

2.d. Define estimation. (CO4) 2

2.e. Dev completed the school project in 20 days. How many days will Arun take to complete the same work if he is 25% more efficient than Dev? (CO5) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. Let the lines of regression concerning two variables x and y be given by : (CO1) 6

$x + y = 32$

$x + 0.25y = 13$

Obtain the value of means and correlation coefficient.

3-b. The following data relate to the profit earned by a company from 1988 to 1993 (by taking 1990 as origin): (CO1) 6

Years	1988	1989	1990	1991	1992	1993
Profit (Rs in 000)	10	12	15	16	18	19

Fit a straight line trend by the method of least squares to the given data.

3-c. In bolt factory, Machines A, B and C manufacture respectively 15%, 25% and 40% of the total. Of their output 5, 4 and 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine C. (CO2) 6

3-d. For the probability density function: $f(x) = cx^2(1-x), 0 < x < 1$. Find the constant c and mean. (CO 2) 6

3.e. A business firm receives on an average 2.5 telephone calls per day during the time period 10:00-10:05 a.m. find the probability that on a certain day, the firm receives ($e^{-2.5} = 0.0821$) (CO 3) 6

i) No call

ii) Exactly four calls, during same period.

3.f. A sample of 400 male students is found to have a mean height of 171.38 cms. Can it be reasonably regarded as a sample from a large population with the mean height 171.17 and s.d. 3.30 cms at 5% level of significance? (CO4) 6

3.g. A and B can together do a piece of work in 15 days. B alone can do it in 20 days. In how many days can A alone do it? (CO5) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Find standard deviation and coefficient of variation from the following distribution: (CO1) 10

C.I.	f
0-5	2
5-10	3
10-15	7
15-20	13
20-25	21
25-30	16
30-35	8
35-40	3

4-b. In a certain exam 10 students obtained the following marks in maths and physics. Find Spearman's rank correlation coefficient : (CO1) 10

x : 90 30 82 45 32 65 40 88 73 66
y : 85 42 75 68 45 63 60 90 62 58

5. Answer any <u>one</u> of the following:-

5-a. If X is a discrete random variable having probability mass function: (CO2) 10

x	0	1	2	3	4	5	6	7
P(X=x)	0	k	2k	2k	3k	k^2	$2k^2$	$(7k^2 + k)$

i) Determine the constant k
ii) Find P(x<6)
iii) What will be P(X ≥ 6)

5-b. If X and Y are two random variables having the joint probability mass function 10

$p(x,y) = \frac{1}{27}(2x+y);\ x = 0,1,2;\ y = 0,1,2.$ Find the conditional distribution of Y for X=x.

6. Answer any <u>one</u> of the following:-

6-a. The Overall percentage of failures in a certain examination is 40. what is the probability that out of group of 6 candidates (CO3) 10
i) At least 4 passed the examination,
ii) No one passed the examination.

6-b. Define Normal Distribution. Write down the properties of Normal Distribution. (CO3) 10

7. Answer any <u>one</u> of the following:-

7-a. 5 identical coins are tossed 320 times, and the no. of heads appearing each time is recorded and the results are: (CO4) 10

No. of heads	0	1	2	3	4	5
frequency	14	15	80	112	61	8

Would you conclude that coins are biased? (tabulated value at 5% level of significance is 11.07)

7-b. The average income of persons was Rs.210 with Standard deviation of Rs.10 in the sample of 100 people of a city. For another sample of 150 persons, the average income was Rs.220 with Standard deviation of Rs.12. Test whether there is any significant difference between the average incomes of the two localities at 5% level of significance. (CO4) 10

8. Answer any <u>one</u> of the following:-

8-a. (i) A and B can do a piece of work in 12 days; B and C in 15 days; C and A in 20 days. In How many days A alone can do the work?
(ii) A train moving at a speed of 63km/hr. enters a railway station and crosses the platform in 20s. if the length of the train is 100m . what is the length of platform? (CO5) 10

8-b. (i) Three pipes A, B and C are attached to a tank. A and B can fill it in 20 and 30 minutes respectively while C can empty it in 15 minutes. If A, B and C are kept open successively for 1 minute each, how soon will the tank be filled?
(ii) A cistern has three pipes A, B and C. A and B can fill it in 3 hours and 4 hours respectively while C can empty the completely filled cistern in 1 hour. If the pipes are opened in order at 3, 4 and 5 p.m. respectively, at what time will the cistern be empty? (CO5) 10