Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: I - CARRY OVER THEORY EXAMINATION - AUGUST 2023

Subject: Introductory Topics in Statistics Probability and Calculus

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.　　　Which of the following is not an example for a primary data? [CO1]　　　1

　　　　　(a) Mailed questionnaire

　　　　　(b) Local correspondents

　　　　　(c) Indirect oral investigation

　　　　　(d) Survey reports in newspapers, journals

1-b.　　　What is secondary data? [CO1]　　　1

　　　　　(a) Existing data

　　　　　(b) Ordinal data

　　　　　(c) Discrete data

　　　　　(d) Unimportant data

1-c.　　　The range of a sample gives an indication of the [CO2]　　　1

　　　　　(a) way in which the values cluster about a particular point

　　　　　(b) number of observations bearing the same value

.

(c) maximum variation in the sample

(d) degree to which the mean value differs from its expected value

1-d.   What is the median of the sample 5, 5, 11, 9, 8, 5, 8 ? [CO2]   1

(a) 5

(b) 6

(c) 8

(d) 9

1-e.   Two items are chosen at random from a 12 items of which 4 are defective. A be   1
the event that 'both items chosen are defective'. What is P(A)? [CO3]

(a) 1/11

(b) 14/33

(c) 10/11

(d) 1/33

1-f.   What is the probability of the event that an even number appears when tossing   1
a fair dice?[CO3]

(a) 1/2

(b) 1/6

(c) 1/4

(d) 2/3

1-g.   Two dice are rolled .Let X is the maximum of the numbers that turns up. If P(X)   1
represents the probability mass function, what is P(X=3)?[CO4]

(a) 1/36

(b) 5/36

(c) 3/36

(d) 7/36

1-h.   For the standard normal variate mean and variance are- [CO4]   1

(a) 0,1

(b) μ, σ^2

(c) 1,0

(d) σ^2, μ

1-i.   The derivative of   1

$f(x) = \sin(x^2)$ is (CO5)

(a) $-\sin(x^2)$

(b) $2x\cos(x^2)$

(c) $-2x\cos(x^2)$

(d) *None of these*

1-j. Double integral is used to compute [CO5] 1

(a) *Volume*

(b) *Length*

(c) *Area*

(d) *None of these*

2. Attempt all parts:-

2.a. "Statistics is used in our day today life" Explain with an example. [CO1] 2

2.b. Which graphical tools are used to describe descriptive statistics? [CO2] 2

2.c. If P(A) = 3/5 and P (B) = 1/5, find P (A∩B) if A and B are independent events.[CO3] 2

2.d. If on an average 8 ships out of 10 arrive safely at a port, find the mean and standard deviation of the number of ships arriving safely out of a total of 1600 ships.[CO4] 2

2.e. Evaluate $\int (5x^2 - 8x + 5)dx$ [CO5] 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. What is the difference between qualitative data and quantitative data in statistics? [CO1] 6

3-b. How Statistics is helpful in medical sciences. [CO1] 6

3-c. For a distribution of 250 heights, calculations showed that the mean, standard deviation β1and β2 were 54 inches, 3 inches, 0 and 3 inches respectively. It was however, discovered on checking that the two items 64 and 52 inches respectively. Calculate the correct frequency constants. [CO2] 6

3-d. Joint probability mass function of X , Y is given by P(x, y) = k (2x + 3y) ; x = 0, 1, 2; y = 1, 2, 3. Find all the marginal and conditional probability and also find probability distribution of X + Y.   **[CO2]** 6

X/Y	1	2	3	
0	3k	6k	9k	18k
1	5k	8k	11k	24k
2	7k	10k	13k	30k

	15k	24k	33k	72

3.e. Two dice are tossed once. Find the probability of getting an even number on the first die or a total of 9. [CO3] 6

3.f. Find the mean and variance of the binomial distribution.[CO4] 6

3.g. If $y = 500e^{7x} + 6000e^{-7x}$ then show that $y_2 - 49\,y = 0$ [CO5] 6

SECTION C 50

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

4-a. "Statistics was originally concerned with matters of State and was regarded as the science of statecraft."Explain the statement. [CO1] 10

4-b. What are the benefits of studying science? & why is it important to learn science? [CO1] 10

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

5-a. An individual purchases three qualities of pencils .The relevant data are given below: **[CO2]** 10

Quality	Price per pencil (R s.)	Money spent (R s.)
A	1.00	50
B	1.50	30
C	2.00	20

Calculate the average price per pencil.

5-b. Draw a histogram to represent the following grouped frequency distribution. **[CO2]** 10

Age (in years)	Number of students
118 – 126	8
127 – 135	10
136 – 144	12
145 – 153	17
154 – 162	7
163 – 171	5
172 - 180	3

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

6-a. In a class of 60 students, 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and NSS. If one of these students is selected at random, find the probability that (i) The student opted for NCC or NSS. (ii) The student has opted 10

neither NCC nor NSS. (iii) The student has opted NSS but not NCC. [CO3]

6-b.   Probability that A will solve a problem is 1/4 and B is 2/3. If A and B work   10
        independently. What is the probability that the problem will be solved by

    a. Both
    b. At least one of them [CO3]

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

7-a.   Find the mean and variance of the Poisson distribution.[CO4]   10

7-b.   1000 light bulbs with a mean life of 120 days are installed in new factory; their   10
        length of life is normally distributed with standard deviation 20 days.
        (i) How many bulb will expirein less than 90 days?
        (ii) if it is decided to replace all the bulbs together, what intervals should be
        allowed between replacements if not more than 10 percent should expire
        before replacement. [CO4]

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

8-a.   Evaluate $\iint xy(x+y)dxdy$ over the area between y = x and $x^2 = y$. [CO5]   10

8-b.   Evaluate $\iint(x^2+y^2)dxdy$ where the region of integration is the area enclosed by   10
        the curves y = 4x, x + y = 3, y = 0 and y = 2.[CO5]