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Printed Page:-4 **Subject Code:- CCSBS0105**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: I - THEORY EXAMINATION (2025 - 2026)
Subject: lntroductory 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 an application of sampling in real-world scenarios?(CO1,K2) 1

(a) Estimating the average income of a population
(b) Predicting election results using exit polls
(c) Quality control in manufacturing industries
(d) All of the above

1-b. Why is secondary data often used in research? (CO1, K2) 1

(a) It is cheaper and quicker to obtain.
(b) It is always more accurate than primary data.
(c) It eliminates the need for sampling.
(d) It guarantees representativeness.

1-c. The dispersion of data in terms of the average deviation from the mean is measured by (CO2 , K2) 1

(a) Variance
(b) Range
(c) Standard deviation
(d) Mean

1-d. A discrete frequency distribution is most suitable for _____ data. (CO2, K2) 1

(a) Data that can take any value
(b) Data with a limited number of possible values
(c) Data measured on a continuous scale
(d) Data that is ungrouped

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1-e. In a random experiment of rolling a die and observing the number shown up, let A be the event "odd number showing up" then A will be (CO3, K2) 1

(a) {1,2,3,6}
(b) {1}
(c) {1,3,5}
(d) {2,6}

1-f. If two events are mutually exclusive, what is the probability that either event A or event B occurs? (CO3, K3) 1

(a) P(A) + P(B)
(b) P(A) * P(B)
(c) P(A ∪ B)
(d) P(A ∩ B)

1-g. A random variable is said to be discrete if its range set is (CO4,K2) 1

(a) Finite
(b) Countably infinite
(c) Either (a) or (b)
(d) Neither (a) nor (b)

1-h. The probability distribution of a random variable X is given below. Find c. (CO4, K3) 1

X	1	0	1
P(X=x)	1/4	c	1/4

(a) 1/2
(b) 1/4
(c) 1
(d) 0

1-i. Evaluate $\int_0^1 \int_0^1 xy\, dx\, dy$. (CO5, K3) 1

(a) 1/3
(b) 4/5
(c) 1/6
(d) 1/2

1-j. $\int \cot^2(x)\, dx$ equals to (CO5, K3) 1

(a) cot x – x + C

(b) -cot x – x + C

(c) cot x + x + C

(d) -cot x + x + C

2. Attempt all parts:-

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2.a.	What is the definition of statistics?(CO1,K1)	2
2.b.	Write three types of graphical methods used to represent data. (CO2, K1)	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, K3)	2
2.d.	What is the probability that in a family of 4 children there will be at least 1 boy? (Assume that the probability of a male birth is 0.5.). (CO4, K3)	2
2.e.	If $y= e^{2x+3}$, Compute y''' (CO5, K3)	2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i)	What are the different applications of statistics in various branches of science? Provide examples (CO1,K2)	6
3.a.(ii)	Differentiate between primary data and secondary data with examples. (CO1,K2)	6

3.b. Answer any one of the following:-

3.b.(i)	Minutes spent on the phone 102 124 108 86 103 82 71 104 112 118 87 95 103 116 85 122 87 100 105 97 107 67 78 125 109 99 105 99 101 92 Make a frequency distribution table with 5 classes. (CO2, K3)	6
3.b.(ii)	The price of a selected stock over a five days period is shown as 170, 110, 170, 156 and 160. Compute the mean, median and mode. (CO2, K3)	6

3.c. Answer any one of the following:-

3.c.(i)	A family has two children. What is the probability that both the children are boys given that at least one of them is a boy? (CO3, K3)	6
3.c.(ii)	An instructor has a question bank consisting of 300 easy True / False questions, 200 difficult True / False questions, 500 easy multiple-choice questions and 400 difficult multiple-choice questions. If a question is selected at random from the question bank, what is the probability that it will be an easy question given that it is a multiple-choice question?(CO3, K3)	6

3.d. Answer any one of the following:-

3.d.(i)	. If there are 3 misprints in a book of 1000 pages, find the probability that a given page will contain (i) No misprint (ii) More than 2 misprints(CO4, K3)	6
3.d.(ii)	In an examination paper, there are 150 MCQs carrying 1 mark each. Every question has 4 choices, and every incorrect answer fetches a negative 0.25 mark. If 1000 students choose random answers with uniform probability, then what would be the total number of expected marks that every student will obtain? (CO4, K3)	6

3.e. Answer any one of the following:-

3.e.(i)	Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{x+y} x\,dx\,dy\,dz$. (CO5, K3)	6
3.e.(ii)	Evaluate $\int\int (x^2+y^2)^{7/2}\,dx\,dy$ over the circle $x^2+y^2=1$.(CO5,K3)	6

SECTION-C 50

4. Answer any one of the following:-

4-a. What is Simple random sampling, Stratified sampling and Quota sampling? Also write one merit and one limitation of these sampling methods. (CO1,K2) 10

4-b. Define statistics and its importance and limitations in detail with the help of suitable examples.(CO1,K1) 10

5. Answer any one of the following:-

5-a. The annual salaries of a group of employees are given in the following table: 10

Salaries (in Rs '000)	45	50	55	60	65	70	75	80
No. of persons	3	5	8	7	9	7	4	7

Calculate the standard deviation of the salaries.(CO2, K3)

5-b. For a moderately skewed data, the A.M. is 100, the variance is 35, and Karl Pearson's coefficient of skewness is 0.2. Find its mode and median. (CO2, K3) 10

6. Answer any one of the following:-

6-a. Bag I contain 3 red and 4 black balls while another Bag II contains 5 red and 6 black balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from Bag II.(CO3, K3) 10

6-b. In a factory which manufactures bolts, machines A, B and C manufacture respectively 25%, 35% and 40% of the bolts. Of their outputs, 5, 4 and 2 percent are respectively defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it is manufactured by the machine B? (CO3, K3) 10

7. Answer any one of the following:-

7-a. 3 bad apples are mixed with 10 good apples. Find the probability distribution of the number of bad apples in drawn of 2 apples. (CO4, K3) 10

7-b. If 10% of bolts are produced by a machine are defective, determine the probability that out of 10 bolts chosen at random : 10

i. 1
ii. None
iii. At most 2 bolts will be defective(CO4, K3)

8. Answer any one of the following:-

8-a. Find the area of an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. (CO5, K3) 10

8-b. Evaluate $\iiint x^2yz\,dx\,dy\,dz$ over the region bounded by $1<x<2, 0<y<2,$ and $1<z<2.$ (CO5,K3) 10