Printed Page:- **Subject Code:- ACSBS0105**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: I - THEORY EXAMINATION (2022 - 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. A numerical value used as a summary measure for a sample, such as a sample mean, is known as a [CO1] 1

(a) Population Parameter

(b) Sample Parameter

(c) Sample Statistic

(d) Population Mean

1-b. A method used to examine inflation rate anticipation, unemployment rate and capacity utilization to produce products is classified as [CO1] 1

(a) Data Exporting Technique

(b) Data Importing Technique

(c) Forecasting Technique

(d) Data Supplying Techniques

1-c. The positive square root of the mean of the squared deviations of some observations from their arithmetic mean is called [CO2] 1

(a) Standard deviation

(b) median

(c) variation

(d) Mode

1-d. The mean of 10 observations is 10. All observations are increased by 10%. The mean of the increased observations shall be [CO2] 1

(a) 20

(b) 11

(c) 10

(d) 100

1-e. Which of the given sets are not an event of the sample space S= {a,1,2,3,z}? [CO3] 1

(a) {a, z}

(b) {1,2,3}

(c) {}

(d) {a, b}

1-f. If P (A)=0.3,P(B)=0.2,P(A∩B)=0.1,what is the probability that exactly one of the events occurs? [CO3] 1

(a) 0.3

(b) 0.4

(c) 0.6

(d) 1

1-g. The probability distribution of a random variable X is given below. Find c. [CO4] 1

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

(a) 1/4

(b) 1/2

(c) 1

(d) 0

1-h. If the p.m.f p(x) of a discrete random variable X is [CO4] 1

x	0	1	2	3
p(x)	1/3	1/2	0	5/6

Then E(X) & V(X)

(a) 0.667,0.556

(b) 0.667, 1.556

(c) 1.667, 0.556

(d) None of these

1-i. What is the value of $\frac{d}{dx}(x^{\sin x})$? (CO5) 1

(a) $x^{\sin x}\cos x \log x - x^{\sin x}\frac{\sin x}{x}$

(b) $x^{\sin x}\cos x \log x + x^{\sin x}\frac{\sin x}{x}$

(c) $x^{\sin x}\sin x \log x + x^{\sin x}\frac{\cos x}{x}$

(d) None of these

1-j. $\int_{-2}^{2} |x|dx$ is equal to (CO5) 1

(a) 0

(b) 2

(c) 1

(d) 4

2. Attempt all parts:-

2.a. State the Methods of Collecting Primary Data. [CO1] 2

2.b. What is measure of central tendency and dispersion? [CO2] 2

2.c. Evaluate P(A∪B), if 2P(A) = P(B) =5/13 and P(A/B) = 2/5. (CO3) 2

2.d. Out of 320 families with 5 children each what percentage would be expected to have 2 boys and 3 girls? (CO4) 2

2.e. If $y = \frac{1}{(1+x)^2}$, find $\frac{d^2y}{dx^2}$. (CO5) 2

SECTION B **30**

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

3-a. Differentiate between internal and external data. [CO1] 6

3-b. Why Statistical analysis is important? [CO1] 6

3-c. The following table shows the daily production of T.V. sets in an industry for 7 days of a week. (CO2) 6

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
No. of T.V sets	300	400	150	250	100	350	200

Represent the above information by a pictograph.

3-d. Obtain the median for the following frequency distribution: **(**CO2) 6

x:	1	2	3	4	5	6	7	8	9
f:	8	10	11	16	20	25	15	9	6

3.e. Let A and B be independent events with P (A) = 0.3 and P(B) = 0.4. Find (i) $P(A \cap B)$ (ii) $P(A \cup B)$ (iii) P (A/B) (iv) P (B/A) (CO3) 6

3.f. Find the standard deviation for the following discrete distribution- (CO4) 6

x	8	12	16	20	24
p(x)	1/8	1/6	3/8	1/4	1/12

3.g. $\text{Evaluate } \int_0^a \left[\int_1^{\sqrt{a^2-y^2}} \sqrt{(a^2-y^2)-x^2}\, dx \right] dy \ (CO5)$ 6

SECTION C **50**

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

4 Define statistics. Discuss its functions, importance and limitations. Explain its uses in commerce and economics. (CO1) 10

4 Find the type of data collection method (Qualitative or Quantitative) that could be used for the following: [CO1] 10

(i) How well do you recommend a institute to another person to take up a course? (ii) To know how many people have attended a training course.

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

5 An analysis of monthly wages paid to the workers of two firms A and B belonging to the same industry gives the following results: (CO2) 10

	Firm A	Firm B
Number of workers	500	600
Average daily wage	R s. 186.00	R s. 175.00
Variance of distribution of wages	81	100

1. Which firm, A or B, has a larger wage bill?
2. In which firm, A or B, is there greater variability in individual wages?
3. Calculate (a) the average daily wage and (b) the variance of the distribution of wages of all the workers in the firms A and B taken together.

5 Following is the distribution of marks obtained by 500 candidates in Statistics paper of a civil services examination : (CO2) 10

Marks more than	:	0	10	20	30	40	50
Number of Candidates	:	500	460	400	200	100	30

Calculate the lower quartile marks. If 70% of the candidates pass in the paper, find the minimum marks obtained by a pass candidate.

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

6 Bag I contains 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) 10

6 Explain the theorem of total probability. Out of two bags, one bag contains 4 black and 6 red balls, second bag contains 3 black and 4 red balls. Any of the bag is chosen at random to select a ball. What is the probability of getting red ball. (CO3) 10

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

7-a. A random variable X has the following probability mass function: (CO4) 10

x	0	1	2	3	4	5	6	7
p(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

(i) Find k

(ii) Evaluate P(X<6), P (X≥6) and P(0<X<5)

(iii) If P (X ≤ a)>1/2 find the minimum value of a

7-b. The daily wages of 1000 workers are distributed around a mean of Rs. 140 and with standard deviation of Rs. 10. Estimate the number of workers whose daily wages will be- (CO4) 10

I. Between Rs. 140 and Rs. 144
II. Less than Rs. 126
III. More than Rs. 160.

Given that $\phi(z) = 1/\sqrt{2\pi}\int_0^z e^{-z^2/2}dz$, $\phi(0.4) = 0.155, \phi(1.4) = 0.419, \phi(2) = 0.0228$.

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

8 Calculate the volume of the solid bounded by surface x=0, y=0, x+y+z=1 and z=0. (CO5) 10

8 Evaluate $\iint xydxdy$ where the region of integration is (CO5) 10
(i) $x + y \leq 1$ in positive quadrant (ii) $x^2 + y^2 = a^2$ in positive quadrant