Printed Page:- Subject Code:- ACSBS0105

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute)

Affiliated to Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow

B.Tech

SEM: I - THEORY EXAMINATION (2021 - 2022)

Subject: Introductory Topics in Statistics, Probability and Calculus

Time: 03:00 Hours Max. Marks: 100

General Instructions:

1. All questions are compulsory. It comprises three Sections A, B and C.

- Section A - Question No- 1 is objective type question carrying 1 mark each & Question No- 2 is very short type questions carrying 2 marks each.
- Section B - Question No- 3 is Long answer type - I questions carrying 6 marks each.
- Section C - Question No- 4 to 8 are Long answer type - II questions carrying 10 marks each.
- 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 Statistics branch includes (CO1) 1

1. Applied Statistics
2. Mathematical Statistics
3. Industry Statistics
4. Both A and B

1 The totality of all objects under a study is called: (CO1) 1

1. Sample
2. Group
3. Population
4. Specimen

1-c. The measure of central tendency listed below is: (CO2) 1

1. The raw score
2. The mean
3. The range
4. Standard deviation

1-d. The arrangement of data in rows and columns is called (CO2) 1

1. Frequency distribution
2. Cumulative frequency distribution
3. Tabulation
4. Classification

1-e. Which among the following is a sample space obtained while tossing a coin thrice? (CO3) 1

1. {(H,T),(T,H),(T,T),(H,H)}
2. {(H,H,H),(H,T,T),(T,T,T)}
3. {(H,H),(T,T)}
4. {(H,H,H),(H,H,T),(H,T,T),(T,H,T),(H,T,H),(T,T,H),(T,H,H),(T,T,T)}

1-f. 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 = : (CO3) 1

1. {1,2,3,6}
2. {1}
3. {1,3,5}
4. {2,6}

1-g. Moment explains about: (CO4) 1

1. Symmetry of distribution
2. Nature of distribution
3. Both (a) & (b)
4. None of these

1-h. Which of the following is a property of probability density function? (CO4) 1

1. $P(X) \geq 0$, for all $x \varepsilon R$
2. $\sum P(x) = 1$, summation taken for all values of x
3. Both (a) and (b)
4. Neither (a) nor (b)

1-i. If $x = a\sin\theta$ and $y = b\cos\theta$, then d^2y/dx^2 is equal to : (CO5) 1

1. $\frac{a}{b^2}sec^2\theta$
2. $\frac{b}{a}sec^2\theta$
3. $\frac{-b}{a^2}sec^3\theta$
4. $a\ sec\ \theta$

1-j. If $x^2 + y^2 = 1$, then (CO5) 1

1. $yy'' - (2y')^2 + 1 = 0$
2. $yy'' + (y')^2 + 1 = 0$
3. $yy'' - (y')^2 - 1 = 0$
4. *None of these*

2. Attempt all parts:-

2-a. What are the main objectives of statistics? (CO1) 2

2-b. What are the different types of classification of data? (CO2) 2

2-c. Evaluate $P(A \cup B)$, if $2P(A) = P(B) = 5/13$ and $P(A/B) = 2/5$. (CO3) 2

2-d. Define Random variable. Explain discrete random variable. (CO4) 2

2-e. If $y = e^{2x+3}$, find d^3y/dx^3 (CO5) 2

SECTION B 30

3. Answer any five of the following:-

3-a. How statistics is helpful in making plans and policies? (CO1) 6

3-b. What are the branches of statistics? How it is important in a company growth rate? (CO1) 6

3-c. The first four moments of a distribution about the value 4 of the variable are -1.5, 17, -30 and 108. Find the moments about mean, $\beta 1$ and $\beta 2$. (CO2) 6

3-d. Define data. Explain univariate and bivariate data.(CO2) 6

3-e. A letter is chosen at random from the word 'ASSASSINATION'. Find the probability that letter is (i) a vowel (ii) a consonant (CO3) 6

3-f. The diameter say X of an electric cable is assumed to be a continuous random variable with p.d.f 6

(x) = 6x(1 - x), $0 \le x \le 1$
(i) Check that above is p.d.f
(ii) Compute $P(X \le 1/2\ 1/3 \le X \le 2/3)$ (CO4)

3-g. If $y = 2 + \log(x)$ then show that $xy_2 + y_1 = 0$ (CO5) 6

SECTION C 50

4. Answer any one of the following:-

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

4-b. "Statistics affects everybody and touches life at many points. It is both a science and art." Explain the statement with suitable examples. (CO1) 10

5. Answer any one of the following:-

5-a. Find the arithmetic mean of the following frequency distribution: (CO2) 10

x:	1	2	3	4	5	6	7
f:	5	9	12	17	14	10	6

5-b. Find the mode of the following frequency distribution: (CO2) 10

Size(x) :	1	2	3	4	5	6	7	8	9	10	11	12
Frequency(f) :	3	8	15	23	35	40	32	28	20	45	14	6

6. Answer any one of the following:-

6-a. State Baye's Theorem. In bolt factory, Machines A,B and C manufacture respectively 25%, 35% 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 B. (CO3) 10

6-b. Define sample space, random experiment and event. Discuss different types of event. (CO3) 10

7. Answer any one 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 $P(X \le a) > 1/2$ find the minimum value of a

7-b. Explain normal distribution and binomial distribution. Write a short note on normal distribution curve. (CO4) 10

8. Answer any one of the following:-

8-a. $Evaluate \int_{-1}^{1}\int_{0}^{z}\int_{x-z}^{x+z}(x+y+z)dydxdz$ (CO5) 10

8-b. $Evaluate \int_{1}^{3}\int_{\frac{1}{x}}^{1}\int_{0}^{\sqrt{xy}}xyzdzdydx$ (CO5) 10