B. Tech. Second Semester (AIDS/CSD/AIML) /
B. Tech.–21-22–SOE–ADS-203 Examination

Course Code : AIDS 2151 / CSD 2151 / AIML 2151 **Course Name : Probability and Statistics**

Time : 3 Hours] [Max. Marks : 40

Instructions to Candidates :—

(1) Do not write anything on question paper except your exam seat number.

(2) Write the answers along with accurate question number in answer book.
(3) All questions are compulsory.
(4) All questions carry marks as indicated.
(5) Use of Logarithmic tables, non – programmable calculator and Statistical tables is permitted.

1. (A1) In a bolt factory machines A, B, C manufacture respectively 25%, 35% and 40%. Of the total of their output 5, 4, 2 percents are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B and C ? 3 (CO 1)

(A2) A discrete random variable x has following probability function :

x	0	1	2	3	4	5	6	7	8
f(x)	a	3a	5a	7a	9a	11a	13a	15a	17a

Find :

(i) Constant a

(ii) $p\,(x < 3)$

(iii) $p\,(1 < x < 6)$

(iv) Distribution function. 3 (CO 1)

2. (A1) A random variable X having the density function :

$$f(x) = \begin{cases} \frac{4x(9-x^2)}{81} & , \ 0 \leq x \leq 3 \\ 0 & , \ \text{otherwise} \end{cases}$$

Find First four moments about the origin and about mean. 4 (CO 1)

(A2) Let X be a discrete random variable X whose probability given by function is

$f(x) = \frac{1}{2^x}$, $x = 1, 2, 3, \ldots \ldots$

Find E(X). 3 (CO 1)

3. (A1) If the probability that an individual will suffer a bad reaction from injection of a given serum is 0.001, determine the probability that out of 2000 individuals :

(1) Exactly 3,

(2) More than 2, individuals will suffer a bad reaction. 4 (CO 2)

(A2) An aptitude test for selecting engineers in an industry is conducted on 100 candidates. The average score is 42 and standard deviation of score is 24. Assuming normal distribution for score.

Find :

(i) Number of candidates whose score is more than 60.

(ii) Number of candidates whose score lie between 30 and 60. 3 (CO 2)

4. (A1) It was found that 2% of the tools produced by a certain machine are defective. What is the probability that in a shipment of 400 such tools :

(1) 3% or more,

(2) 2% or less will prove defective ? 3 (CO 3)

(A2) *A and B are two manufactures of electric bulbs. Bulbs manufactured by A have mean life of 900 hrs. and standard deviation of 30 hrs. Those manufactured by B have mean life of 860 hrs. and standard deviation of 20 hrs. Find the probability that mean life based on a random sample of 40 bulbs of manufacturer A will be less than 28 hrs. of mean life based on a random sample of 30 bulbs of manufacturer B.* 3 (CO 3)

5. (A1) A Random sample of 200 owners of a particular make of car in a big city shows that average run of a car per liter of petrol is 15 Km with a standard deviation is 2·7 Km. Construct 98% confidence interval for mean kilometer per liter of petrol run by all cars of that make in the city. 4 (CO 3)

(A2) There are two branch banks X and Y in a city. A bank official intends to know the difference between the average amount of money customers have to deposit in the two branch banks. A random sample of 64 customers is selected from each branch bank. For branch bank X the sample mean was found to be` Rs. 1350 with variance of Rs. 250. For branch bank Y the sample mean was found to be` Rs. 1200 with variance of Rs. 220. Construct 95% confidence interval for the difference of means. 3 (CO 3)

6. (A1) Using method of least - square, fit a curve $y = ab^x$ to the following data :

x	2	3	4	5	6
y	145	175	210	250	300

4 (CO 4)

(A2) The marks secured by recruits in selection test and proficiency test are given below :

Selection Test	68	64	75	50	64	80	75	40	55	64
Proficiency Test	62	58	68	45	81	60	68	48	50	70

Find rank correlation coefficient. 3 (CO 4)