BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI

Work Integrated Learning Programmes Division

Cluster Programme - M. Tech in AI & ML

II Semester , 2023 – 24(July,2024)

Mid semester Examination (**Regular**)

Course No : AIMLC ZC418
Course Title : Introduction to Statistical Methods
Nature of Exam. : Open Book (Online)
Weightage : 30 Marks
Duration : 120 minutes
Date : 20th July,2024_10 AM

Number of questions:8
Number of Pages: 2

Q. No	Question	Marks
Q.1.	Following is the statistical summary of some data set **HHV** / **WBN** / **BNC** / **HBCN** **Count** 908 / 900 / 867 / 908 **Mean** 150 / 65 / 150 / 68 **S.D** 10 / 5 / 8 / 4 **25%** 90 / 25 / 90 / 30 **50%** 120 / 65 / 125 / 60 **75%** 130 / 70 / 135 / 63 **Minimum** 30 / 15 / 75 / 30 **Maximum** 160 / 75 / 180 / 90 Write at least three inferences based on the above summary which helps in understanding the data	**3M**
Q.2	Let A and B are two independent events with probabilities 0.35 and 0.30 respectively. Then validate the following statements and justify a) $P(A \cup B) = 0$ as they are independent b) $P(A \cap B) = 0$ as they are mutually exclusive c) Find $P(A^c \cap B^c)$ (where A^c indicates the compliment of event A)	**4M**
Q.3	Consider the following probabilities of three events A,B and C: $P(A) = 0.50, P(B) = 0.55, P(C) = 0.45, P(A \cap B) = 0.20, P(B \cap C) = 0.20,$ $P(A \cap C) = 0.15$ and $P(A \cap B \cap C) = 0.05$ Find the following a) $P(A \mid A \cup B)$ b) $P(B \mid A \cap B)$ c) $P(A \cap B \mid A \cup B)$ d) $P(A \cup B \mid A \cap B \cap C)$	**4M**
Q.4	Hardik Pandya, Rishabh Pant and Surya Kumar Yadav are in the race of leading Indian cricket team in the next world cup with probabilities 0.2, 0.5 and 0.3 respectively. The probabilities of getting an increase in the match fee by Hardik, Rishabh and Surya are 0.3, 0.6 and 0.5 respectively if they become the Captain. If there is an increase in match fee then find the probability a) that it is because of Hardhik	**4M**

<table>
<tr><td></td><td>b) that it is because of Rishabh
c) that it is because of Surya Kumar</td><td></td></tr>
<tr><td>Q.5</td><td>Let f(x) be a continuous random variable defined in [0,2] as
f(x) = k(x + 1)/4,then find
a) k value
b) mean of x
c) Expectation of x^2
d) Variance
e) P(0.5 < x < 1.5)</td><td>4M</td></tr>
<tr><td>Q.6</td><td>Let X and Y are two independent random variables with the probability distributions given as
<table>
<tr><td>X</td><td>-1</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td>P(X)</td><td>0.25</td><td>0.15</td><td>0.35</td><td>0.25</td></tr>
</table>
<table>
<tr><td>Y</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>P(Y)</td><td>0.10</td><td>0.20</td><td>0.30</td><td>0.40</td></tr>
</table>
Then find the following
a) If possible find the joint distribution of X and Y. If not, justify it.
b) If possible ,find P(x < 1,Y < 2)
c) If possible, find P(X < 1 / Y < 2)</td><td>4M</td></tr>
<tr><td>Q.7</td><td>Let X be a random variable which follows binomial distribution with n = 150 and p = 0.2 then find P(50 < X < 80)</td><td>4M</td></tr>
<tr><td>Q.8</td><td>It is observed that average amount of time that a customer spends in a super market is 40 minutes with a standard deviation of 5 minutes. Then find the probability of sampling distribution of mean time lies between 35 and 45 minutes where the sample size is 50.</td><td>3M</td></tr>
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