

Jaypee University of Information Technology, Waknaghat

Test-1 Examinations, September 2022

B.Tech - III Semester (CSE/IT)

Course Code/Credits: 18B11MA313/3
Course Title: Probability and Statistics
Course Instructors: RAD, SST

Max. Marks: 15

Max. Time: 1 Hour

Instructions: ALL questions are compulsory and carry equal marks. Scientific calculators are allowed.

- A survey of users of word processors showed that 10% were dissatisfied with the word-processing system they are currently using. Half of those who were dissatisfied had purchased their systems from vendor A. It is also known that 20% of all those surveyed purchased their wordprocessing systems from vendor A. Consider selecting a user at random. (3 Marks) [CO-1]
 - Define the *sample space* and the random events involved in the experiment.
 - Given that a word processor was purchased from vendor A, what is the probability that the user is dissatisfied?
- Of the students in a college, it is known that 60% reside in hostel and 40% are day scholars (not residing in hostel). Previous year results report that 30% of all students who reside in hostel attain 'A' grade and 20% of day scholars attain 'A' grade in their annual examination. At the end of the year, one student is chosen at random. (3 Marks) [CO-1]
 - What is the probability that the selected student has an 'A' grade?
 - What is the probability that the student is a hostler given that he has an 'A' grade?
- Two chips are drawn at random without replacement from a box that contains five chips numbered 1 through 5. If the sum of chips drawn is even, the random variable $X = 5$; if the sum of chips drawn is odd, $X = -3$. (3 Marks) [CO-2]
 - Give the *sample space* Ω .
 - Find $\mathbb{P}(X = -3)$ and $\mathbb{P}(X = 5)$.
 - Determine the *moment-generating function* for X .
- If X and Y are two random variables having joint density function: (3 Marks) [CO-2]
$$f(x, y) = \begin{cases} \frac{1}{8}(6 - x - y) & , 0 < x < 2, 2 < y < 4 \\ 0 & , \text{otherwise} \end{cases}$$
 - Find *marginal density function* of Y .
 - Determine $\mathbb{P}(X + Y < 3)$. Sketch also the *sample space* and the *event* of interest.
- A student takes a true-false examination consisting of 10 questions. He is completely unprepared so he plans to guess each answer. The guesses are to be made at random. For example, he may toss a fair coin and use the outcome to determine his guess. (3 Marks) [CO-3]
 - Compute the probability that he guesses correctly at least nine times.
 - Write down the *moment generating function* for the probability distribution used.

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