DEPARTMENT OF SCIENCE & HUMANITIES, CANARA ENGINEERING COLLEGE

Programme: **B.E.** **CIE:** **ASSIGNMENT**  Semester: **III**

**Course Title:** **MATHEMATICS FOR COMPUTER SCIENCE & BUSINESS SYSTEM**

Course Code: **BCS301**

Date:  **20/01/2024** Submission: **10/02/2024**  Section: **A**

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| **Group No** | **Q.**  **No.** | **Question** |
| G1 | 1 | Find the mean and variance if pdf is . |
| 2 | If and are stochastic matrices, then prove that is also a stochastic matrix. |
| 3 | A sample of 350 days is taken from meteorological records of certain district and 15 of them are found to  be foggy. What are the probable limits to the percentage of foggy days in the district? |
| 4 | A certain stimulus administered to each of 10 patients resulted in the following increases of blood pressure:  -3, 2, 2, -1, 3, -2, 1, 5, 0, 4. Can it be concluded that the stimulus will in general be accompanied by an increase in blood pressure. |
| G2 | 1 | If one in every 1000 of computers produced is defective, determine the probability that a random sample of 8000 will yield fewer than 5 defective computers. |
| 2 | A player has Rs. 200. At each play of a game, he losses Rs. 100 with probability , but wins Rs. 100 with  probability . He stops playing if he lost his Rs 200 or he has won Rs. 300. Find transition probability matrix. Identify the absorbing states. Find the probability that he has 400 Rs in 4th play. |
| 3 | One type of aircraft is found to develop engine trouble in 5 flights out of 200, and another type in 7 flights  out of 300 flights. Is there a significant difference in the two types of aircrafts so for as engine defects are  concerned? |
| 4 | A group of boys and girls were given an intelligence test. The mean score, S.D.s and numbers in each group are as follows.   |  |  |  | | --- | --- | --- | |  | Boys | Girls | | Mean | 123 | 120 | | S.D. | 11 | 10 | |  | 19 | 16 |   Is the mean score of boys significantly different from that of girls? |
| G3 | 1 | Determine the discrete probability distribution, mean, variance of which denotes the minimum of the two numbers that appear when a pair of fair dice is thrown once. |
| 2 | If be a probability vector of a stochastic matrix , then prove that is also probability vector. |
| 3 | Balls are drawn from a bag containing equal number of black and white balls. Each ball being replaced  before drawing another. In 2000 drawings 1018 black and 982 white balls have been drawn. Do you suspect some bias on the part of drawer? |
| 4 | A sample of height of 6000 soldiers has a mean of 68 inches and S.D. 2.5 inches while a sample of heights of 1400 sailors has a mean of 67 inches and S.D. 2.4 inches. Do the data indicate that soldiers are on the average taller than the sailors? |
| G4 | 1 | A university awards distinction, first class, second class, third class or pass class according as the student gets 80% or more; between 60% and 80% ; between 50% and 60% ; between 40% and 50% ; between 30% and 40% , respectively. If 5% of the students obtained distinction and 10% failed. Determine the percentage of students getting second class, assuming that marks are normally distributed. |
| 2 | There are 3 white marbles in box A and 3 red marbles in box B. At each step of the process a marble is selected from each box and the two marbles selected are interchanged. Let the state of the system is number of red marbles in box A. a) Find the transition probability matrix. b) What is the probability that there are 2 red marbles in box A after 3 steps? c) In long run what is the probability that there are 3 red marbles in box A? |
| 3 | 10 dice are thrown 3000 times and a throw of 2, 3 is reckoned as a success. Suppose that 9780 throws of  2, 3 have been made out. Do you think that this observed value deviates from the expected value? If so,  can the deviation from the expected value be due to fluctuations of simple sampling? |
| 4 | A set of five similar coins is tossed 300 times and the result is   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | No. of heads | 0 | 1 | 2 | 3 | 4 | 5 | |  | 9 | 41 | 97 | 103 | 38 | 12 |   Test the hypothesis that the data follow a binomial distribution. |
| G5 | 1 | Verify that is a probability density function. Find mean and . |
| 2 | A player has Rs. 200. He bets Rs. 100 at a time and wins s. 100 with probability . He stops playing if he loses  the Rs. 200 or wins Rs. 300. Find the probability that the game stops in 4 plays. |
| 3 | In a sample of 500 people from a state 230 take tea, and rest take coffee. Can we assume that tea and coffee are equally popular in the state at 5% level of significance? |
| 4 | Ten individuals are chosen at random from a population and their heights in inches are found to be 63, 61,  66, 65, 67, 69, 73, 70, 71, 63 . Test the hypothesis that the mean height of the universe is 65 inches. |
| G6 | 1 | Two cards are drawn at random with replacement from a box which contains 4 cards numbered 2, 2, 3  and 3. Let X denotes the sum of the numbers. Find the probability distribution, |
| 2 | If the joint distribution of and is given by Find the value of and |
| 3 | In a city A 20% of a random sample of 800 school boys had a certain slight physical defect.  In another city B, 19% of a random sample of 600 school boys had the same defect. Is the difference between the proportions significant? |
| 4 | A machinist is making engine parts with axle diameter of 0.8 inch. A random sample of 10 parts shows mean diameter 0.78 inch with a S.D 0.04 inch. On the basis of this sample, would you say that the work is inferior? |
| G7 | 1 | Probability density function of a continuous random variable is given by  . Prove that . Find the mean and variance. |
| 2 | A biased coin is tossed 3 times. Let denote 1 or 0 according as a head or tail occurs on the first toss. Let denote the number of heads which occur. In each trial If the probability of getting head is 0.4, find the joint distribution and marginal distribution of and . Also find. |
| 3 | A random sample of 300 apples was taken from a large consignment and 25 were found to be bad. Estimate  the proportion of the bad apples in the consignment and standard error of the estimate. |
| 4 | The nine items of a sample have the following values: 47, 48, 49, 50, 45, 44, 52, 53 and 51. Does the mean of  these differ significantly from the assumed mean of 47.5? |
| G8 | 1 | Find the mean and variance of a random variable X has density function . |
| 2 | If and are independent random variables, prove that  i) ii) iii) |
| 3 | Find the critical value of in the 1%, 6% and 10% level of significance of both one tailed and two tailed test. |
| 4 | The means of simple samples of sizes 1000 and 2000 are 67.5 and 68.0 cm respectively. Can the samples are drawn from the same population of S.D. 3cm? |
| G9 | 1 | The marks X obtained in mathematics by 1000 students is normally distributed with mean 78% and standard deviation 11%. Determine the number of students with marks above 90%. Within what limits did the middle 90% of students’ marks lie? |
| 2 | Find the unique fixed probability vector of . |
| 3 | A die was thrown times and a throw of 5 was obtained 186 times. On the assumption of random  throwing, do the data indicate an unbiased die? |
| 4 | Two independent samples of size 7 and 6 have the following values.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Sample-A | 28 | 29 | 31 | 32 | 33 | 29 | 32 | | Sample-B | 29 | 30 | 29 | 26 | 28 | 30 |  |     Examine whether the samples have been drawn from normal populations having the same variance.  Given that and . |
| G10 | 1 | Suppose the life span of certain motors is normally distributed with mean 10 years and standard deviation 2 years. If the manufacturer is ready to replace only 3% of motors that fail, how many years of guarantee can he offer? |
| 2 | Two boys and two girls throwing ball from one to another. Each boy throws the ball to other boy with probability , and to each girl with probability . On the other hand each girl throws the ball to each boy with probability , and never to the other girl. If ball is with find the probability that after four throws each receives the ball. |
| 3 | In a group of 60 first cousins there were found to be 27 males and 33 females. Ascertain if the observed  proportions are inconsistent with the hypothesis that the sexes should be in equal proportion. |
| 4 | Eight school boys were given a test in Mathematics. Further they were given a month’s tuition and a second test of equal difficulty was held at the end of it. Do the marks give the evidence that students have benefitted by extra coaching?   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Boys | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | I-test | 20 | 18 | 19 | 21 | 19 | 10 | 18 | 17 | | II-test | 24 | 19 | 22 | 18 | 20 | 22 | 20 | 20 | |
| G11 | 1 | VLSI chips, essential to the running of a computer system, fail in accordance with Poisson distribution with the rate of one chip in about 5 weeks. If there are two spare chips on hand, and if a new supply will arrive in 8 weeks, what is the probability that the during the next 8 weeks the system will be down for a week or more, owing to a lack of chips? |
| 2 | Prom a sack of fruit containing 3 oranges, 2 apples and 3 bananas a random sample of 4 fruits is selected. If X is the number of oranges and Y is the number of apples in the sample. Find the joint probability distribution and. |
| 3 | In two large populations there are 30% and 28% respectively of fair-haired people. Is this difference likely to be hidden in samples of 1000 and 1300 respectively from the two populations? |
| 4 | For a random sample of 16 values with mean 40inches, and the sum of the squares of the deviations from the mean is 130 . Estimate the 99% confident limits for the mean of the population |
| G12 | 1 | A box contains 12 balls of which 3 are white and 9 are red. A sample of 3 balls is selected. Let X denote the number of white balls in the sample. Find the probability distribution, mean and standard deviation of the distribution. |
| 2 | Three cards are drawn from the 12 face cards (jacks, queens and kings) of an ordinary deck of 52 playing cards. Let be the number of kings selected and be the number of jacks. Obtain the joint probability distribution, covariance and coefficient of correlation. |
| 3 | A machine produces 10 defective objects in a sample of 400. After machine is overhauled, it produces 3  defective objects in a batch of 200. Has the machine been improved? |
| 4 | Two horses A and B were tested according to the time (in seconds) to run a particular race gives the  following results   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Horse A | 28 | 30 | 32 | 31 | 33 | 27 | | Horse B | 29 | 30 | 31 | 24 | 27 |  |   Test whether you can discriminate between the two horses. |

**Students Groups:**

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| GROUP NUMBER | USN NUMBER |
| G1 | 4CB22CB001-005 |
| G2 | 4CB22CB006-010 |
| G3 | 4CB22CB011-015 |
| G4 | 4CB22CB016-020 |
| G5 | 4CB22CB021-025 |
| G6 | 4CB22CB026-030 |
| G7 | 4CB22CB031-035 |
| G8 | 4CB22CB036-040 |
| G9 | 4CB22CB041-045 |
| G10 | 4CB22CB046-050 |
| G11 | 4CB22CB051-055&Poornesh |
| G12 | 4CB22CB056-061 |

**Rubrics for Assessment:**

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| **Sl. No.** | **Criteria for Evaluation** | **Marks** |
| 1 | Punctuality in submission | 2 |
| 2 | Structure and format | 4 |
| 3 | orderliness/clarity, readability | 2 |
| 4 | Relevance, correctness of answers | 5 |
| 5 | Academic Honesty | 2 |

**Instructions to Students:**

1. Write the assignment in the assignment book only.
2. Write the date and assignment number in the assignment book.
3. Submit the assignment on time.

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| --- | --- |
| **Signature of Course Instructor with Date** | **Signature of Course Coordinator with Date** |
| Coverage of modules is adequate.  **APPROVED** | |
| **Signature of Senior Faculty/Expert with Date** | **Signature of Senior Faculty/Expert with Date** |
| **HEAD OF THE DEPARTMENT/CHAIRMAN – MODERATION COMMITTEE** | |