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| **20DS401/MA05**  **Hall Ticket Number:**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | | **II/IV B.Tech (Regular) DEGREE EXAMINATION** | | | | **Aug / Sept, 2022** | **DATA SCIENCE** | | | **Fourth Semester** | **Mathematical Foundations for Data Science** | | | **Time:** Three Hours | | **Maximum:** 70 Marks | |  |
| |  |  | | --- | --- | | ***Answer question 1 compulsory.*** | **(14X1 = 14 Marks)** | | ***Answer one question from each unit.*** | **(4X14=56 Marks)** | |  |

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| 1. | a) | |  | | --- | | What is the physical interpretation of mean of a set of data. | |  |  |
|  | b) | Measures of dispersion of a set of data gives what impression about the data |  |  |
|  | c) | What is root mean square deviation |  |  |
|  | d) | What is the difference between mean and weighted mean, give example if necessary. |  |  |
|  | e) | In what scenario Sign test can be applied. |  |  |
|  | f) | What is the significance of Wilcoxon test. |  |  |
|  | g) | What is the test statistic for large sample U test. |  |  |
|  | h) | What is Kruskal-Wallis test , how can u relate this test with U test. |  |  |
|  | i) | Saddle point can be determine for a game with any type (TRUE OR FALSE) |  |  |
|  | j) | When a game is called strictly determinable. |  |  |
|  | k) | What method will be best suitable for a game with payoff matrix of order 2XN. |  |  |
|  | l) | What is state-of-nature in decision making problem? |  |  |
|  | m) | Write Laplace criterion in decision analysis. |  |  |
|  | n) | Explain payoff in decision making problem? |  |  |
| **Unit –I** | | | | |
| 2. | a) | Find the arithmetic mean of the marks from the following table   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | | No. of students | 12 | 18 | 27 | 20 | 17 | 6 | | CO1 | 7M |
|  | b) | Find the mean deviation of the following frequency distribution   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Class | 0-6 | 6-12 | 12-18 | 18-24 | 24-30 | | Frequency | 8 | 10 | 12 | 9 | 5 | | CO1 | 7M |
| **(OR)** | | | | |
| 3. | a) | For the following frequency distribution, compute the standard deviation of 100 students.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Mass in kg | 60-63 | 63-66 | 66-69 | 69-72 | 72-75 | | No. of members | 5 | 18 | 42 | 27 | 8 | | CO1 | 7M |
|  | b) | Find the Karl Pearson's coefficient of skewness for the following data   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Years under | 10 | 20 | 30 | 40 | 50 | 60 | | No. of persons | 15 | 32 | 51 | 78 | 97 | 109 | | CO1 | 7M |
| **Unit –II** | | | | |
| 4. | a) | In a factory, 20 observations of the factors that could heat up a conveyor belt yielded the following results: 0.36, 0.41, 0.25, 0.34, 0.28, 0.26, 0.39, 0.28, 0.40, 0.26, 0.35, 0.38, 0.29, 0.42, 0.37, 0.37, 0.39, 0.32, 0.29 and 0.36. Use the **sign test** at the 0.01 level of signiﬁcance to test the Null hypothesis with mean=0.34. | CO2 | 7M |
|  | b) | Thirty-ﬁve consecutive samples of 100 bearings each, taken from a factory, had, respectively, 1, 2, 5, 3, 4, 2, 6, 8, 1, 2, 3, 9, 8, 0, 12, 10, 5, 4, 1, 8, 6, 7, 9, 4, 8, 1, 2, 6, 7, 5, 8, 1, 3, 4 and 2 unusable bearings. If the fraction unusable is to be maintained at 0.03, construct a p chart for these data and state whether or not this standard is being met. | CO2 | 7M |
| **(OR)** | | | | |
| 5. | a) | Comparing two types of automobile engines, a consumer testing service obtained the following pickup (0 – 100 kmph) times (rounded to the nearest tenth of a second):  Engine A: 13.3 12.1 14 .6 8.9 9.5 12.4 13.2 13.5 13.9 12.9  Engine B: 12.6 13.1 9.8 10.4 12.5 13.6 13.0 12.2 9.9 11.5  Use the **U test** at the 0.05 level of signiﬁcance to check whether it is reasonable to say that the population of pickup times of the two engines is identical.  **P.T.O**  **20DS401/MA05** | CO2 | 7M |
|  | b) | A process for the manufacturer of 4-by-8-foot woodgrained panels has performed in the past with an average of 2.7 imperfections per 100 panels. Construct a chart to be used in the inspection of the panels and discuss the control if 25 successive 100-panel lots contained, respectively, 4, 1, 0, 3, 5, 3, 5, 4, 1, 4, 0, 1, 4, 2, 3, 7, 4, 2, 1, 3, 0, 2, 6, 1, and 3 imperfections. | CO2 | 7M |
| **Unit –III** | | | | |
| 6. | a) | Determine the optimum strategies and value of the following game | CO3 | 7M |
|  | b) | Determine the optimum strategies and value of the following game , also check whether it is strictly determinable and fair or not. | CO3 | 7M |
| **(OR)** | | | | |
| 7. | a) | Solve the following game and find its value | CO3 | 7M |
|  | b) | Solve the following game using dominance property | CO3 | 7M |
| **Unit –IV** | | | | |
| 8. | a) | What is uncertainty and how decision making can be done under uncertainty situation. | CO4 | 7M |
|  | b) | Use the dynamic programming to find the value of maximum  subject to the constraints: and | CO4 | 7M |
| **(OR)** | | | | |
| 9. |  | Use dynamic programming to show that Z= p1 log p1 + p2 log p2 +......+ pn log pn. Subject to the constraints p1 + p2 +...+ pn = 1 and pj >= 0. is a maximum when p1 = p2 =...= pn = 1/n | CO4 | 14M |

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