



SCHOOL OF ADVANCED SCIENCES

Department of Mathematics

Winter Semester 2023-2024

Continuous Assessment Test –I

Programme Name & Branch: B.Tech. Computer Science & Engineering and Business Systems

Slot: B2

Course Name & code: Data Science and Statistical Modelling MAT2005

Class Number (s): VL2023240503856, VL2023240503866

Exam Duration: 90 Min.

Maximum Marks: 50

General instruction(s): Answer all questions.
Statistical tables are permitted.

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Q.No.	Questions	Max Marks																		
1.	The following data gives the experience of machine operators and their performance ratings as given by number of good parts turned out of 100 pieces: <table border="1" style="width: 100%; text-align: center;"> <tr> <td>Experience (years)</td> <td>16</td> <td>12</td> <td>18</td> <td>4</td> <td>3</td> <td>10</td> <td>5</td> <td>12</td> </tr> <tr> <td>Performance rating</td> <td>87</td> <td>88</td> <td>89</td> <td>68</td> <td>78</td> <td>80</td> <td>75</td> <td>83</td> </tr> </table> Calculate regression line of performance rating on experience and estimate the probable performance if an operator has 7 years of experience.	Experience (years)	16	12	18	4	3	10	5	12	Performance rating	87	88	89	68	78	80	75	83	10
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2.	Consider simple correlation coefficients between three variables x_1, x_2, x_3, as $r_{12} = -0.9, r_{13} = -0.2, r_{23} = -0.4$. Calculate the three partial correlation coefficients, $r_{12.3}, r_{13.2}, r_{23.1}$. Based on the values of partial correlation coefficients, can we say anything about consistency of data?	10																		
3.	A drug is given to 10 patients and the increments in their blood pressure were recorded to be 3, 6, -2, 4, -3, 4, 6, 0, 0, 2. Using T-test check whether the drug has any effect on change of blood pressure (i.e. population mean for change of blood pressure, $\mu = 0$) at 5% level of significance?	10																		
4.	Two samples are drawn from two normal population. From the following data, test whether the two samples have same variance at 10% level: <table border="1" style="width: 100%; text-align: center;"> <tr> <td>Sample 1</td> <td>60</td> <td>55</td> <td>72</td> <td>82</td> <td>64</td> <td>77</td> <td>79</td> <td></td> </tr> <tr> <td>Sample 2</td> <td>58</td> <td>72</td> <td>65</td> <td>69</td> <td>74</td> <td>61</td> <td>59</td> <td>63</td> </tr> </table>	Sample 1	60	55	72	82	64	77	79		Sample 2	58	72	65	69	74	61	59	63	10
Sample 1	60	55	72	82	64	77	79													
Sample 2	58	72	65	69	74	61	59	63												
5.	1000 students at a college are graded according to their marks and economic conditions. Use Chi-square test at 5% significance to find out whether there is any association between economic condition and marks. <table border="1" style="width: 100%; text-align: center;"> <tr> <th rowspan="2">Economic conditions</th> <th colspan="3">Marks</th> </tr> <tr> <th>High</th> <th>Medium</th> <th>Low</th> </tr> <tr> <td>Rich</td> <td>160</td> <td>300</td> <td>140</td> </tr> <tr> <td>Poor</td> <td>140</td> <td>100</td> <td>160</td> </tr> </table>	Economic conditions	Marks			High	Medium	Low	Rich	160	300	140	Poor	140	100	160	10			
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