

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 86**  
**(For candidates admitted from the academic year 2023 – 2024)**

**B.COM. DEGREE EXAMINATION, APRIL 2024**  
**COMMERCE**  
**SECOND SEMESTER**

**COURSE** : **ALLIED CORE**  
**PAPER** : **BUSINESS STATISTICS**  
**SUBJECT CODE** : **23CM /AC/BS25**  
**TIME** : **3 HOURS**

**MAX. MARKS: 100**

<b>Q.No.</b>	<b>SECTION A</b> <b>Answer all the questions</b> (5 x 2 = 10)	<b>CO</b>	<b>KL</b>																						
1.	What is a time series?	1	K1																						
2.	Distinguish between Positive and Negative correlation.	1	K1																						
3.	Define “Null Hypothesis	1	K1																						
4.	State any two conditions for the application of the Chi-square test.	1	K1																						
5.	What is the F test? Mention any two uses of the F-test.	1	K1																						
<b>Q.No.</b>	<b>SECTION B</b> <b>Answer all the questions</b> (5 x 2 = 10)	<b>CO</b>	<b>KL</b>																						
6.	If $r = 0.6$ and $N=64$ , find out the probable error of the coefficient of correlation and determine the limits for population $r$ .	2	K2																						
7.	Give the second-degree parabola equation.	2	K2																						
8.	Given the following equation: $Y_c = 45 + 2.6X$ . The origin is 2012, X unit = 1 year, Y = annual production of steel in tons. Forecast the production for the year 2024.	2	K2																						
9.	Find the regression equation of X on Y from the following values: <div style="display: flex; justify-content: space-around; margin-left: 40px;"> <table style="border-collapse: collapse;"> <tr> <td></td> <td style="text-align: center;">X</td> <td style="text-align: center;">Y</td> </tr> <tr> <td>Mean</td> <td style="text-align: center;">65</td> <td style="text-align: center;">67</td> </tr> <tr> <td>Standard Deviation</td> <td style="text-align: center;">2.5</td> <td style="text-align: center;">3.5</td> </tr> </table> </div> Coefficient of correlation = 0.8		X	Y	Mean	65	67	Standard Deviation	2.5	3.5	2	K2													
	X	Y																							
Mean	65	67																							
Standard Deviation	2.5	3.5																							
10.	A sample of 400 items is taken from a population whose standard deviation is 1.5. The mean of the sample is 2.5. Test whether the sample has come from a population with a mean of 26.8.	2	K2																						
<b>Q. No.</b>	<b>SECTION C</b> <b>Answer any two questions</b> (2 x 10 = 20)	<b>CO</b>	<b>KL</b>																						
11.	Assuming a four-yearly cycle calculate the trend by the method of moving averages from the following data relating to the production of tea in India: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 10%;">Year</td> <td>2013</td> <td>2014</td> <td>2015</td> <td>2016</td> <td>2017</td> <td>2018</td> <td>2019</td> <td>2020</td> <td>2021</td> <td>2022</td> </tr> <tr> <td>Production in million lbs</td> <td>464</td> <td>515</td> <td>518</td> <td>467</td> <td>502</td> <td>540</td> <td>557</td> <td>571</td> <td>586</td> <td>612</td> </tr> </table>	Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Production in million lbs	464	515	518	467	502	540	557	571	586	612	3	K3
Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022															
Production in million lbs	464	515	518	467	502	540	557	571	586	612															
12.	Find the correlation between age and playing habits of the following students: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 15%;">Age</td> <td>15</td> <td>16</td> <td>17</td> <td>18</td> <td>19</td> <td>20</td> </tr> <tr> <td>No of students</td> <td>250</td> <td>200</td> <td>150</td> <td>120</td> <td>100</td> <td>80</td> </tr> <tr> <td>Regular Players</td> <td>200</td> <td>150</td> <td>90</td> <td>48</td> <td>30</td> <td>12</td> </tr> </table>	Age	15	16	17	18	19	20	No of students	250	200	150	120	100	80	Regular Players	200	150	90	48	30	12	3	K3	
Age	15	16	17	18	19	20																			
No of students	250	200	150	120	100	80																			
Regular Players	200	150	90	48	30	12																			
13.	Before an increase in GST on high-end motorcycles 400 out of a sample of 500 persons were found to be purchasers. After an increase in the GST and Cess, 300 persons were known to be purchased in a sample of 700 people. Do you think that there has been a significant decrease in the purchase of motorcycles after the increase in the GST.	3	K3																						

Q.No.	<b>SECTION D</b>																										
	<b>Answer any two questions</b>	<b>(2 x 10 = 20)</b>	<b>CO KL</b>																								
14.	<p>The following data is based on 450 students who are given marks in Statistics and Economics at a certain examination.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Particulars</th> <th>Statistics</th> <th>Economics</th> </tr> </thead> <tbody> <tr> <td>Mean Marks</td> <td style="text-align: center;">40</td> <td style="text-align: center;">48</td> </tr> <tr> <td>Standard Deviation</td> <td style="text-align: center;">12</td> <td style="text-align: center;">16</td> </tr> </tbody> </table> <p>The sum of the products of deviation of marks from their respective mean is 42,075. Give the equation to the two lines of regressions. Estimate the average marks in Economics of the candidate who obtained 50 marks in statistics.</p>	Particulars	Statistics	Economics	Mean Marks	40	48	Standard Deviation	12	16	4	K4															
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15.	<p>1000 families were selected at random in a city to test the belief that high-income families usually send their children to public schools and low-income families often send their children to government schools. The following results were obtained:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Income</th> <th colspan="2">School</th> <th rowspan="2">Total</th> </tr> <tr> <th>Public</th> <th>Govt.</th> </tr> </thead> <tbody> <tr> <td>Low</td> <td style="text-align: center;">370</td> <td style="text-align: center;">430</td> <td style="text-align: center;">800</td> </tr> <tr> <td>High</td> <td style="text-align: center;">130</td> <td style="text-align: center;">70</td> <td style="text-align: center;">200</td> </tr> <tr> <td>Total</td> <td style="text-align: center;">500</td> <td style="text-align: center;">500</td> <td style="text-align: center;">1000</td> </tr> </tbody> </table> <p>Test whether income and type of schooling are independent.</p>	Income	School		Total	Public	Govt.	Low	370	430	800	High	130	70	200	Total	500	500	1000	4	K4						
Income	School		Total																								
	Public	Govt.																									
Low	370	430	800																								
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Total	500	500	1000																								
16.	<p>The three samples below have been obtained from normal populations with equal variances. Test the hypothesis that the sample means are equal.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td style="text-align: center;">8</td> <td style="text-align: center;">7</td> <td style="text-align: center;">12</td> </tr> <tr> <td style="text-align: center;">10</td> <td style="text-align: center;">5</td> <td style="text-align: center;">9</td> </tr> <tr> <td style="text-align: center;">7</td> <td style="text-align: center;">10</td> <td style="text-align: center;">13</td> </tr> <tr> <td style="text-align: center;">14</td> <td style="text-align: center;">9</td> <td style="text-align: center;">12</td> </tr> <tr> <td style="text-align: center;">11</td> <td style="text-align: center;">9</td> <td style="text-align: center;">14</td> </tr> </tbody> </table> <p>The table value of F at a 5% level of significance for <math>v_1 = 2</math> and <math>v_2 = 12</math> is 3.88.</p>	8	7	12	10	5	9	7	10	13	14	9	12	11	9	14	4	K4									
8	7	12																									
10	5	9																									
7	10	13																									
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	<b>SECTION E</b>																										
	<b>Answer any two questions</b>	<b>(2 x 20 = 40)</b>	<b>CO KL</b>																								
17.	<p>Find the seasonal variation by the ratio-to-trend method from the data given below:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Year</th> <th>1<sup>st</sup> Quarter</th> <th>2<sup>nd</sup> Quarter</th> <th>3<sup>rd</sup> Quarter</th> <th>4<sup>th</sup> Quarter</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">2021</td> <td style="text-align: center;">86</td> <td style="text-align: center;">95</td> <td style="text-align: center;">96</td> <td style="text-align: center;">99</td> </tr> <tr> <td style="text-align: center;">2022</td> <td style="text-align: center;">96</td> <td style="text-align: center;">102</td> <td style="text-align: center;">104</td> <td style="text-align: center;">110</td> </tr> <tr> <td style="text-align: center;">2023</td> <td style="text-align: center;">103</td> <td style="text-align: center;">108</td> <td style="text-align: center;">106</td> <td style="text-align: center;">107</td> </tr> </tbody> </table>	Year	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter	2021	86	95	96	99	2022	96	102	104	110	2023	103	108	106	107	5	K5				
Year	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter																							
2021	86	95	96	99																							
2022	96	102	104	110																							
2023	103	108	106	107																							
18.	<p>Calculate Pearson's coefficient correlation from the following data. Take 65 and 70 as the assumed average of the variate X and Y respectively.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">45</td> <td style="text-align: center;">55</td> <td style="text-align: center;">56</td> <td style="text-align: center;">58</td> <td style="text-align: center;">60</td> <td style="text-align: center;">65</td> <td style="text-align: center;">68</td> <td style="text-align: center;">70</td> <td style="text-align: center;">75</td> <td style="text-align: center;">80</td> <td style="text-align: center;">85</td> </tr> <tr> <td style="text-align: center;">Y</td> <td style="text-align: center;">56</td> <td style="text-align: center;">50</td> <td style="text-align: center;">48</td> <td style="text-align: center;">60</td> <td style="text-align: center;">62</td> <td style="text-align: center;">64</td> <td style="text-align: center;">65</td> <td style="text-align: center;">70</td> <td style="text-align: center;">74</td> <td style="text-align: center;">82</td> <td style="text-align: center;">90</td> </tr> </tbody> </table>	X	45	55	56	58	60	65	68	70	75	80	85	Y	56	50	48	60	62	64	65	70	74	82	90	5	K5
X	45	55	56	58	60	65	68	70	75	80	85																
Y	56	50	48	60	62	64	65	70	74	82	90																
19.	<p>A sample of 300 students of UG and 300 students of PG classes of a university were asked to give their opinion towards the autonomous colleges. 190 of the UG and 210 of the PG students favoured the autonomous status. Present the above fact in the form of a frequency table and test, at a 5% level, that opinions of UG and PG students on the autonomous status of colleges are independent. (Table value of chi-square at 5% level for 1 d.f is 3,84)</p>	5	K5																								

20.

A company which produces stationary items wants to diversify into the photocopy paper manufacturing business. The company has decided to first test market the product in three areas terms as the north, central and south areas. The company takes a random sample of five salesmen S1, S2, S3, S4 and S5 for this purpose. The sales volume generated by these five salesmen (in thousand rupees) and total sales in different regions are given in the Table below:

Region	Salesmen					Region's Total
	S1	S2	S3	S4	S5	
North	24	30	26	23	32	135
Central	22	32	27	25	31	137
South	23	28	25	22	32	130
Salesmen's Total	69	90	78	70	95	402

Perform a two-way analysis of Variance to examine:

1. Whether the salesmen significantly differ in performance?
2. Whether there is a significant difference in terms of sales capacity between the regions?

Take 95% as confidence level for testing the hypotheses.

5

K5

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