22MIB211N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCom (IB) DEGREE EXAMINATION MAY 2025
(Second Semester)

Branch - **INTERNATIONAL BUSINESS**

BUSINESS STATISTICS AND OPTIMIZATION TECHNIQUES

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Karl Pearson's coefficient of skewness is used to measure a) The symmetry of a distribution b) The spread of data c) The average value d) The correlation between variables	K1	CO1
	2	If the mean is greater than the median in a data set, the distribution is a) Symmetric b) Positively skewed c) Negatively skewed d) Normally distributed	K2	CO1
2	3	Which diagram is used to visually represent the correlation between two variables? a) Histogram b) Pie Chart c) Scatter Diagram d) Line Graph	K1	CO2
	4	The correlation coefficient ranges between a) 0 and 1 b) -1 and 1 c) -∞ and ∞ d) 0 and ∞	K2	CO2
3	5	The t-test is used for: a) Testing the mean of a single population b) Testing the variance of a population c) Testing categorical data d) Measuring correlation	K1	CO3
	6	The F-test is used to compare a) Two means b) Two proportions c) Two variances d) Two regression lines	K2	CO3
4	7	The Hungarian method is used for solving a) Regression equations b) Transportation problems c) Assignment problems d) Correlation problems	K1	CO4
	8	The Least Cost Method helps to a) Minimize transportation costs b) Maximize total profits c) Equalize demand and supply d) Predict future costs	K2	CO4
5	9	Decision-making under uncertainty involves: a) Certain outcomes b) Risk-free decisions c) Lack of complete information d) Fixed probabilities	K1	CO5
	10	In game theory, a saddle point represents: a) The best strategy for both players b) A point of maximum risk c) An unstable equilibrium d) A strategy with no optimal outcome	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

<table>
<tr><th>Module No.</th><th>Question No.</th><th>Question</th><th>K Level</th><th>CO</th></tr>
<tr><td rowspan="3">1</td><td>11.a.</td><td>Calculate median and mode for the following data.
<table>
<tr><td>Class Interval</td><td>40-50</td><td>50-60</td><td>60-70</td><td>70-80</td><td>80-90</td><td>90-100</td><td>100-110</td></tr>
<tr><td>Frequency</td><td>32</td><td>65</td><td>128</td><td>167</td><td>136</td><td>79</td><td>43</td></tr>
</table></td><td rowspan="3">K2</td><td rowspan="3">CO1</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>11.b.</td><td>Compute Bowley's Coefficient of Skewness.
<table>
<tr><td>No. of children per family</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>6</td><td>7</td></tr>
<tr><td>No. of families</td><td>7</td><td>10</td><td>16</td><td>25</td><td>18</td><td>11</td><td>8</td></tr>
</table></td></tr>
<tr><td rowspan="3">2</td><td>12.a.</td><td>State the properties of regression equations</td><td rowspan="3">K4</td><td rowspan="3">CO2</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>12.b.</td><td>Rankings of 10 trainees at the beginning (x) and at the end(y) of a certain course are given below.
<table>
<tr><td>Trainees</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>I</td><td>J</td></tr>
<tr><td>X</td><td>1</td><td>6</td><td>3</td><td>9</td><td>5</td><td>2</td><td>7</td><td>10</td><td>8</td><td>4</td></tr>
<tr><td>Y</td><td>6</td><td>8</td><td>3</td><td>7</td><td>2</td><td>1</td><td>5</td><td>9</td><td>4</td><td>10</td></tr>
</table>
Calculate Rank correlation.</td></tr>
<tr><td rowspan="3">3</td><td>13.a.</td><td>In a sample of 1000 people in Maharashtra, 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance.</td><td rowspan="3">K3</td><td rowspan="3">CO3</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>13.b.</td><td>The mean weekly sales of soap bars in departmental stores was 146.3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful?</td></tr>
<tr><td rowspan="3">4</td><td>14.a.</td><td>Find the initial basic feasible solution to the following transportation problem using VAM, given the cost matrix.
$$\begin{array}{c} \\ S_1 \\ S_2 \\ S_3 \end{array}\begin{array}{c} \begin{array}{cccc} D_1 & D_2 & D_3 & D_4 \end{array} \\ \begin{pmatrix} 20 & 25 & 28 & 31 \\ 32 & 28 & 32 & 41 \\ 18 & 35 & 24 & 32 \end{pmatrix} \end{array}\begin{array}{c} \text{Supply} \\ 200 \\ 180 \\ 110 \end{array}$$
Demand: 150 40 180 170</td><td rowspan="3">K4</td><td rowspan="3">CO4</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>14.b.</td><td>Summarize the steps involved in North-West corner method.</td></tr>
<tr><td rowspan="3">5</td><td>15.a.</td><td>What is the Expected Monetary Value (EMV) criterion? How is it used in decision-making?</td><td rowspan="3">K3</td><td rowspan="3">CO5</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>15.b.</td><td>Consider a "modified" form of "matching biased coins" game problem. The matching player is paid Rs. 8.00 if the two coins turn both heads and Rs. 1.00 if the coins turn both tails. The non-matching player is paid Rs. 3.00 when the two coins do not match. Given the choice of being the matching or non-matching player, which one would you choose and what would be your strategy?</td></tr>
</table>

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

<table>
<tr><th>Module No.</th><th>Question No.</th><th>Question</th><th>K Level</th><th>CO</th></tr>
<tr><td>1</td><td>16</td><td>a) Calculate arithmetic mean, geometric mean and harmonic mean from the following data.
<table>
<tr><td>x</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td><td>20</td></tr>
<tr><td>f</td><td>5</td><td>18</td><td>20</td><td>10</td><td>6</td><td>1</td></tr>
</table>
b) Compute Karl Pearson's Coefficient of Skewness.
<table>
<tr><td>x</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td></tr>
<tr><td>f</td><td>15</td><td>20</td><td>30</td><td>25</td><td>10</td></tr>
</table></td><td>K4</td><td>CO1</td></tr>
<tr><td>2</td><td>17</td><td>From the following data obtain two regression equations.
<table>
<tr><td>X</td><td>6</td><td>2</td><td>10</td><td>4</td><td>8</td></tr>
<tr><td>Y</td><td>9</td><td>11</td><td>5</td><td>8</td><td>7</td></tr>
</table></td><td>K3</td><td>CO2</td></tr>
<tr><td>3</td><td>18</td><td>Below are given the gain in weights (in kgs.) of pigs fed on two diets A and B.
Gain in weight
Diet A: 25, 32, 30, 34, 24, 14, 32,24,30, 31,35,25
Diet B: 44, 34,22, 10, 47, 31, 40,30,32, 35, 18, 21, 35, 29, 22.
Test, if the two diets differ significantly as regards their effect on increase in weight.</td><td>K4</td><td>CO3</td></tr>
<tr><td>4</td><td>19</td><td>Explain the method of solving an assignment problem using Hungarian method.</td><td>K3</td><td>CO4</td></tr>
<tr><td>5</td><td>20</td><td>Explain the concept of game theory and discuss its applications in economics and business decision-making.</td><td>K4</td><td>CO5</td></tr>
</table>

Z-Z-Z END