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22MIB211N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCom(IB) DEGREE EXAMINATION MAY 2026
(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	The measures of central tendency affected most by the extreme values is (i) Harmonic mean (ii) Geometric mean (iii) Median (iv) Arithmetic mean	K1	CO1
	2	When mean = 40 and SD = 4, the coefficient of variation is (i) 10 (ii) 40 (iii) 100 (iv) 50	K2	CO1
2	3	The coefficient of correlation: (i) Has no limits (ii) Can be less than 1 (iii) Can be more than 1 (iv) Varies between $\pm$ 1	K1	CO2
	4	When one regression coefficient is negative, the other would be (i) negative (ii) positive (iii) zero (iv) one	K2	CO2
3	5	If on the basis of a sample, a hypothesis is to be rejected, at 1% level of significance, then p values will be (i) = 0.01 (ii) < 0.01 (iii) > 0.01 (iv) < 0.005	K1	CO3
	6	F – Distribution is the distribution of _____ of variances. (i) Sum (ii) Difference (iii) Ratio (iv) Product	K2	CO3
4	7	The solution to a transportation problem with m sources and n destinations is feasible, if the numbers of positive allocations are (i) m + n (ii) mn (iii) m + n – 1 (iv) m + n + 1	K1	CO4
	8	If number of sources is not equal to number of destination in Assignment problem then it is called _____ (i) Unbalanced (ii) Unsymmetrical (iii) Symmetric (iv) Balanced	K2	CO4
5	9	The size of the pay-off matrix of a game can be reduced by using the principal of (i) dominance (ii) rotation reduction (iii) game inversion (iv) game transpose	K1	CO5
	10	The minimum expected opportunity loss (EOL) is equal to (i) EMV (ii) EVPI (iii) minimum regret (iv) both (b) and (c)	K2	CO5

SECTION - B (35 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Distinguish between absolute and relative measures of dispersion.	K4	CO1
		(OR)		
	11.b.	The weekly salaries of a group of employees are given in the following table. Analyze the standard deviation and coefficient of variation.		

Salary (In '00)	75	80	85	90	95	100
No. of employees	3	7	18	12	6	4

Cont...

<table>
<tr><td rowspan="3">2</td><td>12.a.</td><td colspan="2">Explain the various types of scatter diagram.</td><td rowspan="3">K5</td><td rowspan="3">CO2</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>12.b.</td><td colspan="2">From the following data, determine the Karl Pearson's coefficient of correlation.
<table>
<tr><td>Price</td><td>12</td><td>9</td><td>8</td><td>10</td><td>11</td><td>13</td><td>7</td></tr>
<tr><td>Supply</td><td>14</td><td>8</td><td>6</td><td>9</td><td>11</td><td>12</td><td>3</td></tr>
</table></td></tr>
<tr><td rowspan="3">3</td><td>13.a.</td><td colspan="2">Explain the general procedure of testing of hypothesis.</td><td rowspan="3">K4</td><td rowspan="3">CO3</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>13.b.</td><td colspan="2">Explain the testing procedure of equality of two means for large samples.</td></tr>
<tr><td rowspan="3">4</td><td>14.a.</td><td colspan="2">Explain the procedure of solving Vogel's approximation method.</td><td rowspan="3">K5</td><td rowspan="3">CO4</td></tr>
<tr><td colspan="2">(OR)</td></tr>
<tr><td>14.b.</td><td colspan="2">Determine an initial basic feasible solution to the following transportation problem by using North – West corner method.
<table>
<tr><td></td><td>D_1</td><td>D_2</td><td>D_3</td><td>D_4</td><td>Available</td></tr>
<tr><td>O_1</td><td>6</td><td>4</td><td>1</td><td>5</td><td>14</td></tr>
<tr><td>O_2</td><td>8</td><td>9</td><td>2</td><td>7</td><td>16</td></tr>
<tr><td>O_3</td><td>4</td><td>3</td><td>6</td><td>2</td><td>5</td></tr>
<tr><td>Requirement</td><td>6</td><td>10</td><td>15</td><td>4</td><td></td></tr>
</table></td></tr>
<tr><td rowspan="3">5</td><td>15.a.</td><td colspan="2">Explain with examples the concept Dominance Properties in game theory.</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 colspan="2">Solve the following game using expected gain method.
<table>
<tr><td></td><td colspan="2">Player B</td></tr>
<tr><td></td><td>1</td><td>7</td></tr>
<tr><td>Player A</td><td>6</td><td>2</td></tr>
</table></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>The following are the marks of 90 students. Analyze the data by applying Mean, Median and Mode.
<table>
<tr><td>Marks</td><td>45-49</td><td>50-54</td><td>55-59</td><td>60-64</td><td>65-69</td><td>70-74</td></tr>
<tr><td>No. of Students</td><td>6</td><td>14</td><td>12</td><td>10</td><td>10</td><td>9</td></tr>
<tr><td>Marks</td><td>75-79</td><td>80-84</td><td>85-89</td><td>90-94</td><td>95-99</td><td></td></tr>
<tr><td>No. of Students</td><td>9</td><td>10</td><td>5</td><td>4</td><td>1</td><td></td></tr>
</table></td><td>K4</td><td>CO1</td></tr>
<tr><td>2</td><td>17</td><td>Price indices of cotton (X) and wool (Y) are given below for the 12 months of a year. Analyze the equations of lines of two regressions between the indices.
<table>
<tr><td>X</td><td>78</td><td>77</td><td>85</td><td>88</td><td>87</td><td>82</td><td>81</td><td>77</td><td>76</td><td>83</td><td>97</td><td>93</td></tr>
<tr><td>Y</td><td>84</td><td>82</td><td>82</td><td>85</td><td>89</td><td>90</td><td>88</td><td>92</td><td>83</td><td>89</td><td>98</td><td>99</td></tr>
</table></td><td>K4</td><td>CO2</td></tr>
<tr><td>3</td><td>18</td><td>Explain the testing procedure of ANOVA.</td><td>K3</td><td>CO3</td></tr>
<tr><td>4</td><td>19</td><td>Determine the optimal solution for the assignment problem with the following cost matrix.
<table>
<tr><td></td><td></td><td>W</td><td>X</td><td>Y</td><td>Z</td></tr>
<tr><td rowspan="4">Salesman</td><td>A</td><td>11</td><td>17</td><td>8</td><td>16</td></tr>
<tr><td>B</td><td>9</td><td>7</td><td>12</td><td>6</td></tr>
<tr><td>C</td><td>13</td><td>16</td><td>15</td><td>12</td></tr>
<tr><td>D</td><td>14</td><td>10</td><td>12</td><td>11</td></tr>
</table>
Area</td><td>K5</td><td>CO4</td></tr>
<tr><td>5</td><td>20</td><td>The estimated sales of proposed types of perfumes are as follows:
<table>
<tr><td>Types of perfumes</td><td colspan="3">Estimated level of sales (units)</td></tr>
<tr><td></td><td>Rs.20000</td><td>Rs.10000</td><td>Rs.20000</td></tr>
<tr><td>A</td><td>25</td><td>15</td><td>10</td></tr>
<tr><td>B</td><td>40</td><td>20</td><td>5</td></tr>
<tr><td>C</td><td>60</td><td>25</td><td>3</td></tr>
</table>
For each of the following decisions, state the optimal action and specify the value leading to its selection: (i) Maximin (ii) Maximax (iii) Minimax regret.</td><td>K5</td><td>CO5</td></tr>
</table>

Z-Z-Z END