**END TERM EXAMINATION**

**FIRST SEMESTER [MBA] JANUARY - 2013**

**Paper Code: MS 103**
**Subject: Decision Sciences**

**Time: 3 Hours**
**Maximum Marks: 60**

**Note:** Attempt any five questions. Graph Paper and statistical tables to be provided. All questions carry equal marks.

**Q1.** The following data give the number of finished articles turned out per day by different number of works in a factory:

<table>
<thead>
<tr>
<th>No. of articles:</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
<th>25</th>
<th>26</th>
<th>27</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of workers:</td>
<td>3</td>
<td>7</td>
<td>11</td>
<td>14</td>
<td>18</td>
<td>17</td>
<td>13</td>
<td>8</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Find the mean value, standard deviation and coefficient of variation of daily output of finished articles.

**Q2.** The following data show the experience of machine operators and their performance ratings as given by the number of good parts turned out per 100 pieces:

<table>
<thead>
<tr>
<th>Operator:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience (X):</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 (Y):</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>
</tbody>
</table>

Calculate the regression line of performance ratings on experience and estimate the probable performance if an operator has 10 years experience.

**Q3.** A firm manufactures two products A & B on which the profit earned per unit are Rs. 3 and Rs. 4 respectively. Each product is processed on two machines M1 and M2. Product A requires one minute of processing time on M1 and two minutes on M2, while B requires one minute on M1 and one minute on M2. Machine M1 is available for not more than 7 hours and 30 minutes, while machine M2 is available for 10 hours during any working day. Find the number of units of product A and B to be manufactured to get maximum profit.

**Q4.** Assume that the firms are competing for market share for a particular product. Each firm is considering what promotional strategy to employ for the coming period. Assume that the following pay off matrix describes the increase in market share for firm A and the decrease in market share for firm B. Determine the optimum strategies for each firm.

\[
\begin{array}{ccc}
\text{Firm A} & \text{No Promotion} & \text{Moderate Promotion} & \text{Much Promotion} \\
\text{No Promotion} & 5 & 0 & -10 \\
\text{Moderate Promotion} & 10 & 6 & 2 \\
\text{Much Promotion} & 20 & 15 & 10 \\
\end{array}
\]

(i) Which firm would be the winner, in terms of market shares?

(ii) Would the solution strategies necessarily maximize profits for either of the firms?

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P.T.O.
Four professors are each capable of teaching any one of four different courses. Class preparation time in hours for different topics varies from professor to professor and is given in the table below. Each professor is assigned only one course. Determine an assignment schedule so as to minimize the total course preparation time for all courses.

<table>
<thead>
<tr>
<th>Professor</th>
<th>Linear programming</th>
<th>Queueing Theory</th>
<th>Dynamic programming</th>
<th>Regression Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>10</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>B</td>
<td>15</td>
<td>4</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>C</td>
<td>13</td>
<td>14</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>15</td>
<td>13</td>
<td>9</td>
</tr>
</tbody>
</table>

Q6. Use Vogel's Approximation method to obtain an initial basic feasible solution of the transportation problem:

\[
\begin{array}{cccc|c}
& F & G & Available \\
A & 16 & 17 & 14 & 250 \\
B & 16 & 14 & 10 & 300 \\
C & 21 & 13 & 19 & 400 \\
\end{array}
\]

Demand 200 225 275 250

Q8. Write short notes on any three of the following:
(a) Poisson Distribution
(b) Average Deviation
(c) Simplex Method
(d) PERT
(e) Poisson Queueing systems
Model (M/M/1): (<</FIFO)