Roll No: ----------

UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2018

Programme: B. Plan. **Semester – II**
Course Name: Statistical and Quantitative Methods in Planning-II **Max. Marks : 100**
Course Code: MATH 1007 **Duration : 3 Hrs**
No. of page/s: 02

Instructions:
Attempt all questions from **Section A** (each carrying 4 marks); attempt all questions from **Section B** (each carrying 8 marks)**;** attempt **Section C** (each carrying 20 marks)**.**

Section A
(All questions are compulsory)

1.	Explain the properties of correlation coefficient.	**[4]**	**CO1**
2.	Define feasible solution, infeasible solution and basic feasible solution.	**[4]**	**CO2**
3.	Describe the components of decision making.	**[4]**	**CO4**
4.	Write all the conditions to apply the ANOVA.	**[4]**	**CO3**
5.	Discuss the properties and conditions for chi-square test.	**[4]**	**CO3**

SECTION B
(Q6, Q7, Q8, Q9 are compulsory and Q10 has internal choices)

6.	Calculate the coefficient of correlation between x and y for the following data x: 65, 66, 67, 68, 69, 70, 71 y: 67, 68, 66, 69, 72, 72, 69	**[8]**	**CO1**
7.	A stenographer claims that she can type at the rate of 120 words per minute. Can we reject her claim on the basis of 100 trials in which she demonstrates a mean of 116 words with a standard deviation of 15 words? Use 5% level of significance. (Given $Z_{0.05}$=1.96)	**[8]**	**CO3**
8.	Find out the regression coefficient of Y on X from the following data: X: 1, 2, 3, 4, 5 Y: 160, 180, 140, 180, 200	**[8]**	**CO1**

<table>
<tr>
<td>9.</td>
<td>The following table gives the number of accidents that occurred during the various days of the week. Find whether the accidents are uniformly distributed over the week. (Given $\Psi^2_{6,\,0.05}$=12.59)
<table>
<tr><td>Days</td><td>Sun.</td><td>Mon.</td><td>Tue.</td><td>Wed.</td><td>Thu.</td><td>Fri.</td><td>Sat.</td></tr>
<tr><td>No. of Accidents</td><td>14</td><td>16</td><td>8</td><td>20</td><td>11</td><td>9</td><td>14</td></tr>
</table>
</td>
<td>[8]</td>
<td>CO3</td>
</tr>
<tr>
<td>10.</td>
<td>Use the graphical method to solve the following LP problem
Max. $Z = 15x_1 + 10x_2$
subject to the constraints
$4x_1 + 6x_2 \le 360$
$3x_1 \le 180$
$5x_2 \le 200$
$x_1, x_2 \ge 0$
OR
Define Basic solution and optimum basic feasible solution with an example.</td>
<td>[8]</td>
<td>CO2</td>
</tr>
<tr>
<td colspan="4">SECTION C
(Q11.A, Q11.B are compulsory and Q12 has internal choices)</td>
</tr>
<tr>
<td>11.A</td>
<td>Ruth and Charlie play a game. At each play, Ruth and Charlie simultaneously extend either one or two fingers and call out a number. The player whose call equals the total number of extended fingers wins that many pennies from the opponent. In the event that neither player’s call matches the total, no money changes hands.
i) Write down a pay-off matrix for this game (here the strategy (1, 2) means that the player holds up one finger and shouts 2).
ii) What is the payoff for Ruth if Ruth shows two fingers and calls out 4 and Charlie shows 1 finger and calls out 3? What is the payoff for Charlie in this situation?</td>
<td>[10]</td>
<td>CO4</td>
</tr>
<tr>
<td>11.B</td>
<td>A company has three production facilities S_1, S_2 and S_3 with production capacity 7, 9and 18 units per week of a product, respectively. These units are to be shipped to four warehouses D_1, D_2, D_3 and D_4 with requirement of 5, 6, 7 and 14 units per week, respectively. The transportation costs per unit (in rupees) between factories to warehouses are given in the following table:
<table>
<tr><td></td><td>D_1</td><td>D_2</td><td>D_3</td><td>D_4</td><td>Capacity</td></tr>
<tr><td>S_1</td><td>19</td><td>30</td><td>50</td><td>10</td><td>7</td></tr>
<tr><td>S_2</td><td>70</td><td>30</td><td>40</td><td>60</td><td>9</td></tr>
<tr><td>S_3</td><td>40</td><td>8</td><td>70</td><td>20</td><td>18</td></tr>
<tr><td>Demand</td><td>5</td><td>8</td><td>7</td><td>14</td><td>34</td></tr>
</table>
Solve this transportation problem.</td>
<td>[10]</td>
<td>CO2</td>
</tr>
</table>

12	The three samples below have been obtained from normal populations with equal variances. Test the hypothesis at 5% level that the population means are equal: 8 7 12 10 5 9 7 10 13 14 9 12 11 9 14 (The table value of F at 5% level of significance for v_1=2 and v_2=12 is 3.88) **OR** The following table gives the yield on 15 sample fields under three varieties of seeds (*viz*., A, B, C). A B C 20 18 25 21 20 28 23 17 22 16 25 28 20 15 32 Test at 5% level of significance whether the average yields of land under different varieties of seeds show significant differences. Table value of F at 5% level for v_1=2 and v_2=12 is 3.88)	**[20]**	**CO3**

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Instructions:
Attempt all questions from **Section A** (each carrying 4 marks); attempt all questions from **Section B** (each carrying 8 marks)**;** attempt **Section C** (each carrying 20 marks)**.**

Section A
(All questions are compulsory)

1.	Explain Merits and limitations of rank correlation coefficient.	**[4]**	**CO1**
2.	Define Basic solution and optimum basic feasible solution.	**[4]**	**CO2**
3.	Describe the various environments for decision making.	**[4]**	**CO4**
4.	Write all the conditions to apply the ANOVA.	**[4]**	**CO3**
5.	Discuss the applications of chi-square test.	**[4]**	**CO3**

SECTION B
(Q6, Q7, Q8, Q9 are compulsory and Q10 has internal choices)

6.	Calculate the coefficient of correlation between Marks in Physics and Marks in Chemistry for the following data *Marks in Physics*: 65, 66, 67, 68, 69, 70, 71 *Marks in Chemistry*: 67, 68, 66, 69, 72, 72, 69	**[8]**	**CO1**
7.	Ten objects are chosen at random from a large population and their weights are found to be in gms: 63, 63, 64, 65, 66, 69, 69, 70, 70, and 71. In the light of this data, discuss the suggestion that the mean weight in the universe is 65 gms. (Given $t_{0.05,\,9}$=2.262)	**[8]**	**CO3**
8.	Find out the regression coefficient of Y on X from the following data: X: 2, 4, 6, 8, 10 Y: 16, 18, 14, 18, 20	**[8]**	**CO1**

<table>
<tr><td>9.</td><td>The following table gives the number of births that occurred during the various days of the week. Find whether the births are uniformly distributed over the week.
<table><tr><td>Days</td><td>Sun.</td><td>Mon.</td><td>Tue.</td><td>Wed.</td><td>Thu.</td><td>Fri.</td><td>Sat.</td></tr><tr><td>No. of births</td><td>4</td><td>6</td><td>8</td><td>2</td><td>1</td><td>9</td><td>4</td></tr></table>(Given $\Psi^2_{6,\,0.05}$=12.59)</td><td>[8]</td><td>CO3</td></tr>
<tr><td>10.</td><td>Use the graphical method to solve the following LP problem
Max. $Z = 3x_1 + 2x_2$
Subject to the constraints
$4x_1 + 6x_2 \le 36$
$3x_1 \le 18$
$5x_2 \le 20$
$x_1, x_2 \ge 0$
OR
Define feasible solution, infeasible solution and basic feasible solution with an example.</td><td>[8]</td><td>CO2</td></tr>
<tr><td colspan="4">SECTION C
(Q11.A, Q11.B are compulsory and Q12 has internal choices)</td></tr>
<tr><td>11.A</td><td>A producer of boats has estimated the following distributions of demand for a particular kind of boat:
<table><tr><td>No. Demanded</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>Probability</td><td>0.14</td><td>0.27</td><td>0.27</td><td>0.18</td><td>0.09</td><td>0.04</td><td>0.01</td></tr></table>Each boat cost him Rs. 7000 and he sells them for Rs. 10000 each. Any boat that is left unsold must be disposed off for Rs. 6000 each. How many boats should be in stock so as to maximize his expected profit?</td><td>[10]</td><td>CO4</td></tr>
<tr><td>11.B</td><td>A company has three production facilities S_1, S_2 and S_3 with production capacity 8, 10 and 12 units per week of a product, respectively. These units are to be shipped to four warehouses D_1, D_2, D_3 and D_4 with requirement of 7, 8, 10 and 5 units per week, respectively. The transportation costs per unit (in rupees) between factories to warehouses are given in the following table:
<table><tr><td></td><td>D_1</td><td>D_2</td><td>D_3</td><td>D_4</td><td>Capacity</td></tr><tr><td>S_1</td><td>19</td><td>30</td><td>50</td><td>10</td><td>8</td></tr><tr><td>S_2</td><td>70</td><td>30</td><td>40</td><td>60</td><td>10</td></tr><tr><td>S_3</td><td>40</td><td>8</td><td>70</td><td>20</td><td>12</td></tr><tr><td>Demand</td><td>7</td><td>8</td><td>10</td><td>5</td><td>30</td></tr></table>Solve this transportation problem.</td><td>[10]</td><td>CO2</td></tr>
</table>

12.	The three samples below have been obtained from normal populations with equal variances. Test the hypothesis at 5% level that the population means are equal: 8 7 12 10 5 9 7 10 13 14 9 12 11 9 14 (The table value of F at 5% level of significance for v_1=2 and v_2=12 is 3.88) **OR** The following table gives the yield on 15 sample fields under three varieties of seeds (*viz*., A, B, C). A B C 20 18 25 21 20 28 23 17 22 16 25 28 20 15 32 Test at 5% level of significance whether the average yields of land under different varieties of seeds show significant differences. Table value of F at 5% level for v_1=2 and v_2=12 is 3.88)	**[20]**	**CO3**