Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Operations Research **Semester: III**
Program: BBA All / B.Com.(H) / Int. BBA-MBA **Time : 03 hrs.**
Course Code: DSQT 2006 **Max. Marks: 100**

Instructions:

SECTION A
10Qx2M=20Marks

S. No.		Marks	CO
1	Operations Research is a very powerful tool for (a) Operations (b) Research (c) Decision making (d) Simulation	2	CO1
2	Operation research approach is (a) Multidisciplinary (b) Artificial (c) Intuitive (d) Limited to some fields	2	CO1
3	A model is (a) An essence of reality (b) An approximation (c) An idealization (d) All of the options	2	CO1
4	Which technique is used in finding a solution for optimizing a given objective, such as profit maximization or cost reduction under certain constraints? (a) Queuing theory (b) Network analysis (c) Linear programming (d) None (e) Intuitive	2	CO1
5	The position in the payoff matrix where the maximin coincides with the minimax (a) Saddle point (b) Key point (c) Pivot point (d) None of the above	2	CO1
6	In standard of LPP, the constraint $X + Y + Z = 40$ then Z is said to be (a) Slack variable (b) Surplus variable (c) Artificial variable (d) None	2	CO1
7	The set of values of the decision variables $X_1, X_2, \ldots, X_n$ satisfying the constraints and non-negativity restrictions of the problem is called	2	CO1

<table>
<tr><td></td><td>(a) Optimal solution
(b) Feasible solution
(c) Bounded solution
(d) Unbounded solution</td><td></td><td></td></tr>
<tr><td>8</td><td>The transportation problem deals with the transportation of
(a) Single product from a source to several destinations
(b) Several products from a source to a destination
(c) Single product from several sources to a destination
(d) Several products from several sources to several destinations</td><td>2</td><td>CO1</td></tr>
<tr><td>9</td><td>In least cost method first allocation is made at
(a) Lower right corner of the table
(b) Upper right corner of the table
(c) Highest costly cell of the table
(d) None of the above</td><td>2</td><td>CO1</td></tr>
<tr><td>10</td><td>The method used for solving an assignment problem is called
(a) Simplex method
(b) Big-M method
(c) Least cost method
(d) Hungerian method</td><td>2</td><td>CO1</td></tr>
<tr><td colspan="4">SECTION B
4Qx5M= 20 Marks</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>1</td><td>Explain various types of decision-making environment.</td><td>5</td><td>CO2</td></tr>
<tr><td>2</td><td>Define inventory, inventory control and discuss various type of cost involved in this.</td><td>5</td><td>CO2</td></tr>
<tr><td>3</td><td>Explain the assumptions in linear programming problem.</td><td>5</td><td>CO2</td></tr>
<tr><td>4</td><td>In a certain game player has three possible courses of action L, M and N, while B has two possible choices P and Q. Payments to be made according to the choice made.

<table><tr><th>Choices</th><th>Payments</th></tr><tr><td>L,P</td><td>A pays B Rs.3</td></tr><tr><td>L,Q</td><td>B pays A Rs. 3</td></tr><tr><td>M,P</td><td>A pays B Rs.2</td></tr><tr><td>M,Q</td><td>B pays A Rs.4</td></tr><tr><td>N,P</td><td>B pays A Rs.2</td></tr><tr><td>N,Q</td><td>B pays A Rs.3</td></tr></table>
What are the best strategies for players A and B in this game? What is the value of the game for A and B?</td><td>5</td><td>CO2</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">SECTION-C
3Qx10M=30 Marks</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td>1</td><td>Solve the following LPP by simplex method.
$MaxZ = 3X_1 + 8X_2$
$Subject\ to\ constraints$
$5X_1 + 10X_2 \leq 60$
$4X_1 + 4X_2 \leq 40$
$X_1, X_2 \geq 0$
Also form the dual of the above given LPP.</td><td>10</td><td>CO3</td></tr>
<tr><td>2</td><td>A manufacturing company produces two types of products A1 and A2. The profits per Kg of the two products are Rs.40 and Rs.50 respectively. These two products require processing in three types of machines. The following table shows the available machine hours per day and the time required on each machine to produce one Kg of A1 and A2.
<table>
<tr><td>Profit/kg</td><td>A1</td><td>A2</td><td>Total availability hours/day</td></tr>
<tr><td>M1</td><td>2</td><td>3</td><td>60</td></tr>
<tr><td>M2</td><td>3</td><td>5</td><td>80</td></tr>
<tr><td>M3</td><td>5</td><td>6</td><td>110</td></tr>
</table>
a. Formulate the problem in the form of linear programming model.
b. Form the dual of the above LPP.</td><td>10</td><td>CO3</td></tr>
<tr><td>3</td><td>Explain the following term (a) two-person zero sum game (b) Pure strategy (c) Mixed strategy. Also solve the following game and find the best strategy for player A and B.
<table>
<tr><td rowspan="2" colspan="2">Strategy</td><td colspan="4">Player B</td></tr>
<tr><td>B1</td><td>B2</td><td>B3</td><td>B4</td></tr>
<tr><td rowspan="4">Player A</td><td>A1</td><td>-5</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>A2</td><td>5</td><td>4</td><td>6</td><td>8</td></tr>
<tr><td>A3</td><td>4</td><td>0</td><td>2</td><td>-3</td></tr>
<tr><td>A4</td><td>3</td><td>0</td><td>13</td><td>8</td></tr>
</table></td><td>10</td><td>CO3</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">SECTION-D
2Qx15M= 30 Marks</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td>1</td><td>Formulate the general LPP for the given transportation problem and obtain the optimal solution by least cost method and Vogel’s Approximation method.</td><td>10</td><td>CO4</td></tr>
</table>

	<table><tr><th rowspan="2">Source</th><th colspan="4">Destination</th><th rowspan="2">Supply</th></tr><tr><th>A</th><th>B</th><th>C</th><th>D</th></tr><tr><td>I</td><td>3</td><td>1</td><td>7</td><td>4</td><td>300</td></tr><tr><td>II</td><td>2</td><td>6</td><td>5</td><td>9</td><td>400</td></tr><tr><td>III</td><td>8</td><td>3</td><td>3</td><td>2</td><td>500</td></tr><tr><td>Demand</td><td>400</td><td>200</td><td>250</td><td>350</td><td></td></tr></table>		
2	The following table represent Course of actions and states of nature. Find the best course of action using the following criterion. (a) Maximin criterion (b) Maximax criterion (c) Savage minimax regret criterion (d) Laplace criterion. (e) Hurwicz criterion (Alpha = 0.6) <table><tr><th rowspan="2">Course of actions</th><th colspan="3">States of nature</th></tr><tr><th>N1</th><th>N2</th><th>N3</th></tr><tr><td>S1</td><td>600</td><td>200</td><td>100</td></tr><tr><td>S2</td><td>400</td><td>450</td><td>50</td></tr><tr><td>S3</td><td>300</td><td>300</td><td>300</td></tr></table>	10	CO3