Name: **Enrolment** **No:**	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

ODD_ Supple Examination, December 2023

Course: Operations Research — Semester: III

Program: BBA All — Time : 03 hrs.

Course Code: DSQT2006 — Max. Marks: 100

Instructions: Attempt all the questions

SECTION A
10Qx2M=20Marks

S. No.		Marks	CO
1	Which among the following costs is the expense of storing inventory for a specified period of time? (a) Financial cost (b) Storing cost (c) Carrying cost (d) Purchasing cost	2	CO1
2	If the Minimax are (10,18,16) and Maximin are (8,10,7). The saddle point is ___ (a) 7 (b) 10 (c) 18 (d) 8	2	CO1
3	A given TP is said to be unbalanced, if the total supply is not equal to the total ---------- (a) Optimization (b) Demand (c) Cost (d) None of the above	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) Intuitive	2	CO1

5	----------are the restrictions or limitations imposed on the LPP. (a) objective function (b) variables (c) constraints (d) profit	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 (a) Optimal solution (b) Feasible solution (c) Bounded solution (d) Unbounded solution	2	CO1
8	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	2	CO1
9	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	2	CO1
10	The method used for solving an assignment problem is called (a) Simplex method (b) Big-M method (c) Least cost method (d) Hungerian method	2	CO1

<table>
<tr><td colspan="4">SECTION B
4Qx5M= 20 Marks</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>11</td><td>Discuss the simulation along with its applicability. Also discuss its advantages and disadvantages.</td><td>5</td><td>CO2</td></tr>
<tr><td>12</td><td>Define EOQ, Ordering and Holding cost.</td><td>5</td><td>CO2</td></tr>
<tr><td>13</td><td>Explain the assumptions in linear programming problem.</td><td>5</td><td>CO2</td></tr>
<tr><td>14</td><td>The matrix given below illustrates a game, where competitors A and B areassumed to be equal in ability and intelligence. A has a choice of strategy 1 or strategy 2, while B can select strategy 1 or strategy 2. Find the value of the game and optimum strategy for player A and B.
<table>
<tr><td colspan="2" rowspan="2"></td><td colspan="2">B’s strategy</td></tr>
<tr><td>B1</td><td>B2</td></tr>
<tr><td rowspan="2">A’s strategy</td><td>A1</td><td>4</td><td>6</td></tr>
<tr><td>A2</td><td>3</td><td>5</td></tr>
</table></td><td>5</td><td>CO2</td></tr>
<tr><td colspan="4">SECTION-C
3Qx10M=30 Marks</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

15	Explain the following term (a) two-person zero sum game (b) Pure strategy (c) Mixed strategy. Also obtain the value of the game and findthe best strategy for player A and B. Player A / Strategy: A1 (-5, -3, 0, 4); A2 (5, 6, 4, 8); A3 (4, 0, 2, -3); A4 (3, 0, 13, 8) — Player B: B1, B2, B3, B4	10	CO3
16	Suppose an industry is manufacturing two types of products P1 and P2. The profits per Kg of the two products are Rs.40 and Rs.60 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 P1 and P2. Profit/kg: P1 — P2 — Total availability hours/day Machine 1: 2 — 3 — 600 Machine 2: 4 — 2 — 800 Machine 3: 2 — 3 — 1100 a. Formulate the problem in the form of linear programming model. b. Form the dual of the above LPP.	10	CO3
17	Solve the following assignment problem using Hungarian Method. The matrix entries are processing times in hours. Job / Operator: O1, O2, O3, O4 J1: 2, 10, 9, 7 J2: 15, 4, 14, 8 J3: 13, 14, 16, 11 J4: 3, 15, 13, 8	10	CO3
SECTION-D **2Qx15M= 30 Marks**			

18	<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> Formulate the general LPP for the above transportation problem and obtain optimal solution by least cost method and Vogel's Approximation method.	15	CO4
19	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 = 0.5) <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>	15	CO4