Name: **Enrolment No:**	

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

Course: Optimization Techniques **Semester: III**
Program: BBA CORE OM **Time: 03 hrs.**
Course Code: DSIT 2012 **Max. Marks: 100**

Instructions: Usage of calculator allowed.

SECTION A
10Qx2M=20Marks

S. No.		Marks	CO
Q 1	Fill in the blanks, each carry 2 marks.		
1.1	Operations research is a ----------to problem solving for executive management.	**2**	**CO1**
1.2	Goal programming is applied for the situations which have ----------.	**2**	**CO1**
1.3	----------refers to problems in which objective function is quadratic in form while the constraints are linear.	**2**	**CO1**
1.4	----------, which is essence of operations research, do not take into account qualitative factors or emotional factors which are quite real.	**2**	**CO1**
1.5	---------is a condition that exists when there is no solution to an linear programming problem that satisfies all the constraints and non-negativity restrictions.	**2**	**CO1**
1.6	In the transportation model, the ------- on a given route is directly proportional to the number of units shipped on that route.	**2**	**CO1**
1.7	A network is defined as a set of ----- which are connected by ……..	**2**	**CO1**
1.8	The variables which specify the condition of decision process and summarize the current ‘status’ of the system are called ----------.	**2**	**CO1**
1.9	------- criterion provides the decision-maker with optimistic criterion.	**2**	**CO1**
1.10	In the queuing model, the service discipline followed is ----------.	**2**	**CO1**

SECTION B
4Qx5M= 20 Marks

2.1	Distinguish between linear and non-linear programming.	**5**	**CO2**
2.2	Write a short note on branch and bound algorithm using example.	**5**	**CO2**

<table>
<tr><td>2.3</td><td>Explain the multiple objective optimization problem using relevant business examples.</td><td>5</td><td>CO2</td></tr>
<tr><td>2.4</td><td>Discuss the gravity location model for facility location planning.</td><td>5</td><td>CO2</td></tr>
<tr><td colspan="4">SECTION-C
3Qx10M=30 Marks</td></tr>
<tr><td>3.1</td><td>Describe the economic order quantity model with relevant business example.</td><td>10</td><td>CO3</td></tr>
<tr><td>3.2</td><td>Find and classify the stationary points of the function
$$f(x,y) = x^2 + 6y - 3y^2 + 10$$</td><td>10</td><td>CO3</td></tr>
<tr><td>3.3</td><td>Explain the importance of dynamic programming models.</td><td>10</td><td>CO3</td></tr>
<tr><td colspan="4">SECTION-D
2Qx15M= 30 Marks</td></tr>
<tr><td>4.1</td><td>Five projects are being evaluated over a 3-year planning horizon. The following table gives the expected returns for each project and the associated yearly expenditures.
<table>
<tr><td></td><td colspan="3">Expenditures ($ million)/year</td><td rowspan="2">Returns
($ million)</td></tr>
<tr><td>Project</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>1</td><td>6</td><td>2</td><td>9</td><td>30</td></tr>
<tr><td>2</td><td>3</td><td>8</td><td>12</td><td>50</td></tr>
<tr><td>3</td><td>5</td><td>10</td><td>4</td><td>40</td></tr>
<tr><td>4</td><td>9</td><td>6</td><td>3</td><td>20</td></tr>
<tr><td>5</td><td>10</td><td>9</td><td>7</td><td>25</td></tr>
<tr><td>Available funds
($ million)</td><td>40</td><td>30</td><td>50</td><td></td></tr>
</table>
Formulate the ILP model by constructing the appropriate parameter table.</td><td>15</td><td>CO4</td></tr>
<tr><td>4.2</td><td>Consider the assignment problem having the following cost table.
<table>
<tr><td colspan="2"></td><td colspan="4">Task</td></tr>
<tr><td colspan="2"></td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td rowspan="4">Assignee</td><td>A</td><td>8</td><td>6</td><td>5</td><td>7</td></tr>
<tr><td>B</td><td>6</td><td>5</td><td>3</td><td>4</td></tr>
<tr><td>C</td><td>7</td><td>8</td><td>4</td><td>6</td></tr>
<tr><td>D</td><td>6</td><td>7</td><td>5</td><td>6</td></tr>
</table>
Formulate this problem by constructing the appropriate parameter table, and find the optimal solution.</td><td>15</td><td>CO4</td></tr>
</table>