



Mid – Term Examination Fall-2020
Date: 30/11/2020

Course Code: _____ **Course Title:** Operations Research
Prerequisite: _____ **Instructor:** Ahmad Hassan
Module: _____ **Program:** Mgmt **Total Marks:** 30 **Time Allowed:** 3 hrs (180 min)

Note: Attempt all questions.

Q1.	(a)	What are the four qualities which a Linear Programming Problem should have?	Marks 4																						
Q2.	(a)	What are the 5 steps of Formulation?	Marks 5																						
Q3.	(a)	<p>Draw a table and formulate for the following Problem:</p> <p>A carpenter makes tables and chairs. Each table requires 7 wooden blocks and 4 man hours to complete, while each chair takes 3 wooden blocks and 6 man hours. He has 100 such wooden blocks and 80 man hours at his disposal. The only limitation imposed on him is that number of chairs must be at least 2 times number of tables. He makes a profit of Rupees 10 on each table that he sells and Rupees 6 on a chair.</p>	Marks 5																						
	(b)	<p>Find the Graphical solution for the following:</p> $Z_{min} = 5x_1 + 4x_2$ <p>Subject to:</p> <p>I. $x_1 - 2x_2 \leq 1$</p> <p>II. $x_1 + 2x_2 \geq 3$</p> <p>III. $x_1, x_2 \geq 0$</p>	Marks 6																						
Q4.		<p>Formulate and Solve the following problem using graphical method.</p> <p>A firm uses lathes, milling machines and grinding machines to produce two machine parts. Table here represents the machine time required for each part, the machining times available on different machines and the profit on each machine part. Find the no. of parts 1 and 2 to be manufactured per week to maximize the profit.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Type of Machine</th> <th colspan="2">Machine timing required for the machine part (minutes)</th> <th rowspan="2">Maximum time available per week (minutes)</th> </tr> <tr> <th>1</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>Lathes</td> <td>12</td> <td>6</td> <td>3000</td> </tr> <tr> <td>Milling Machines</td> <td>4</td> <td>10</td> <td>2000</td> </tr> <tr> <td>Grinding Machines</td> <td>2</td> <td>3</td> <td>900</td> </tr> <tr> <td>Profit per unit</td> <td>Rs: 40</td> <td>Rs: 100</td> <td></td> </tr> </tbody> </table> <p>Finally, what does the solution tell us?</p>	Type of Machine	Machine timing required for the machine part (minutes)		Maximum time available per week (minutes)	1	2	Lathes	12	6	3000	Milling Machines	4	10	2000	Grinding Machines	2	3	900	Profit per unit	Rs: 40	Rs: 100		Marks 10
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