

(i) Printed Pages : 4]

Roll No. ....

(ii) Questions : 9]

Sub. Code : 

0	8	3	9
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Exam. Code : 

0	0	1	6
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**Bachelor of Commerce 6th Semester  
Examination**

**1047**

**OPERATION RESEARCH**

**Paper : BCM-605**

**Time : 3 Hours]**

**[Max. Marks : 80**

**Note :-** Attempt any *five* questions in all, selecting at least *one* question from each Unit. Each question carries 16 marks.

**Section-A**

1. Attempt any *four* questions from this Section :

(i) Define OR.

(ii) Write the dual of the following LP :

$$\text{Min } z = 4x_2 + 5x_3$$

$$2x_1 - x_2 + 4x_3 \leq 3$$

$$2x_2 - 5x_3 \geq 7$$

$$x_1, x_2, x_3 \geq 0$$

**N-565**

( 1 )

Turn Over

- (iii) Explain uncertainty. How can you avoid it ?
- (iv) In a balanced transportation problem with  $m$  sources and  $n$  destinations what is the number of non-basic variables ?
- (v) Describe the Maximin and Minimax Principle of Game Theory.
- (vi) Solve the following game using odds method :

-1	3
2	-1

### Section-B

- 2. Explain the significance and scope of Operational Research with suitable example.
- 3. Solve the following linear programming problem by simplex method.

Maximize :

$$z = 4x_1 + 3x_2 + 4x_3 + 6x_4$$

$$x_1 + 2x_2 + 2x_3 + 4x_4 \leq 80$$

$$2x_1 + 2x_3 + x_4 \leq 60$$

$$3x_1 + 3x_2 + x_3 + x_4 \leq 80$$

$$x_1, x_2, x_3, x_4 \geq 0$$

4. A painter has exactly 32 units of yellow dye and 54 units of green dye. He plans to mix as many gallons as possible of color A and color B. Each gallon of color A requires 4 units of yellow dye and 1 unit of green dye. Each gallon of color B requires 1 unit of yellow dye and 6 units of green dye. Find the maximum number of gallons he can mix.
5. A company has 4 machines available for assignment to 4 tasks. Any machine can be assigned to any task, and each task requires processing by one machine. The time required to set up each machine for the processing of each task is given in the table below :

	Time (hours)			
	Task 1	Task 2	Task 3	Task 4
Machine 1	13	4	7	6
Machine 2	1	11	5	4
Machine 3	6	7	2	8
Machine 4	1	3	5	9

How company minimize the total setup time needed for the processing of all four tasks ?

### Section-C

6. Explain the concept of decision making under certainty and risk. What are the assumptions in decision making under certainty ? What are the limitations ? Exemplify.
7. State three applications of game theory in marketing and also explain Decision Tree.
8. Check whether the following game possesses saddle point. If so, what is the value of the game ?

8	5	8
8	3	5
7	4	5
6	6	6

9. Solve the following game using the dominance rule :

4	2	0	2	1	1
4	3	1	3	2	2
4	3	7	-5	1	2
4	3	4	-1	2	2
4	3	3	-2	2	2