



MARWADI UNIVERSITY

Faculty of Technology

Information and Communication Technology

B.Tech

SEM: VI

MID-SEM. EXAM: I

MARCH: 2023

Subject: - Optimization Technique (01CT0614)

Date:- 01/03/2023

Total Marks:-30

Time: - 75 Minutes

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Do not write/sign/indication/tick mark anything other than Enroll No. at a specific place on the question paper.

**Question: 1.** Answer the following questions: [6]

(a) Multiple Choice Questions: [3]

1. For analyzing any problem, a decision-maker should study
  - a. Its quantitative aspect
  - b. Its qualitative aspect
  - c. Both a and b
  - d. Neither a nor b
2. An optimization model
  - a. Provides the best decision
  - b. Provides decision within its limited context
  - c. Helps in evaluating various alternatives
  - d. All of the above
3. Graphical method of Linear Programming uses
  - a. Objective function equation
  - b. Constraint equations
  - c. Linear equations
  - d. All of the above

(b) Define the following: [3]

1. Feasible Solution
2. Functional Constraints
3. Objective Function

**Question: 2.** Answer the following questions: [12]

(a) Enlist and explain various phases of operational Research. [6]

(b) Solve the following questions using Graphical method: [6]

- i. Maximize  $Z = 60X_1 + 40X_2$  subject to constraints  
 $2X_1 + 2X_2 = 60$ ;  $X_1 \leq 25$ ;  $X_2 \leq 35$ ;  $X_1, X_2 \geq 0$
- ii. Maximize  $Z = -X_1 + 2X_2$  subject to constraints  
 $X_1 - X_2 \leq -1$ ;  $-0.5X_1 + X_2 \leq 2$ ;  $X_1, X_2 \geq 0$

**OR**

- (b) The security and traffic force, on the eve of Republic Day, must satisfy the staffing requirements as shown in the table: [6]

Time	Number of officers required
0:01 – 4:00	5
4:01 – 8:00	7
8:01 – 12:00	15
12:01 – 16:00	7
16:01 – 20:00	12
20:01 – 24:00	9

Officers work 8-hour shifts starting at each of the 4-hour intervals as given in the table. How many officers should report for the duty at the beginning of each time period in order to minimize the total number of officers needed to satisfy the requirements? Formulate the LINEAR PROGRAMMING MODEL to minimize the number of officers required on duty at the beginning of each time period.

**Question: 3.** Answer the following questions [12]

- (a) Use the simplex method to solve the following LP problem. [08]

Maximize  $Z = 3X_1 + 5X_2 + 4X_3$

subject to the constraints

(i)  $2X_1 + 3X_2 \leq 8$ ,

(ii)  $2X_2 + 5X_3 \leq 10$ ,

(iii)  $3X_1 + 2X_2 + 4X_3 \leq 15$

$X_1, X_2, X_3 \geq 0$

- (b) ABC Limited has three production shops that supply a product to five warehouses. [04]  
The cost of transportation are given below:

	Warehouse						Supply
		I	II	III	IV	V	
SHOP	A	6	4	4	7	5	100
	B	5	6	7	4	8	125
	C	3	4	6	3	4	175
Demand		60	80	85	105	70	

Calculate the optimized transportation cost for the given problem.

**OR**

- (a) Maximize the organizing function  $Z = 12X_1 + 16X_2$  using Simplex Linear [08]  
Programming method with subject to the constraints

$10X_1 + 20X_2 \leq 120$ ;  $8X_1 + 8X_2 \leq 80$ ;  $X_1, X_2 \geq 0$

- (b) ICT Limited has three production shops that supply a product to four warehouses. [04]  
The cost of transportation are given below:

	Warehouse					Supply
		I	II	III	IV	
SHOP	A	19	30	50	10	7
	B	70	30	40	60	9
	C	40	8	70	20	18
Demand		5	8	7	14	

Calculate the optimized transportation cost for the given problem.

*---Best of Luck---*

## - Bloom's Taxonomy Report -

**Sub:** Optimization Technique (01CT0614)

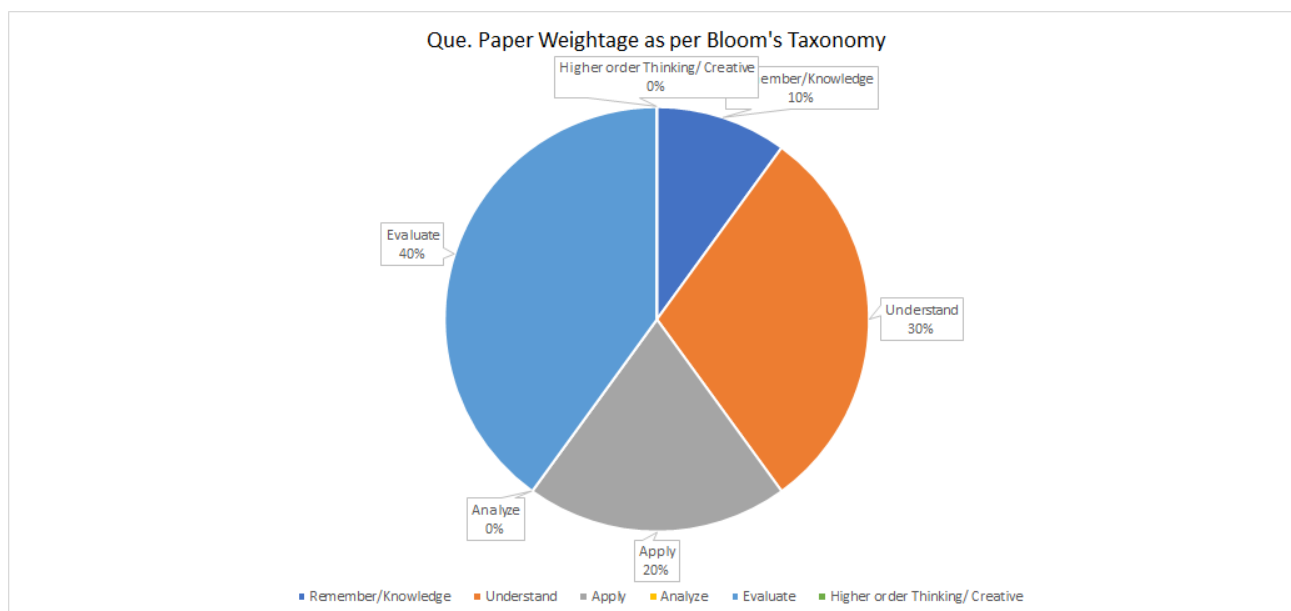
**Sem. VI**

**Branch:** Information and Communication Technology

### Que. Paper weightage as per Bloom's Taxonomy

LEVEL	% of weightage	Question No.	Marks of Que.
Remember/Knowledge	10	Q. 1 (a)	3
Understand	30	Q.1 (b), Q.2 (a)	3+6
Apply	20	Q.2 (b)	6
Analyze	---	---	0
Evaluate	40	Q.3	12
Higher order Thinking/ Creative	---	---	0

### Chart/Graph of Bloom's Taxonomy



## Course Outcome Wise Questions

Subject Code	<b>01CT0614</b>	Subject	<b>OPTIMIZATION TECHNIQUES</b>
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CO No.	Course Outcome
<b>CO1</b>	Cast engineering minima/maxima problems into optimization framework.
	<b>1(A)</b>
<b>CO2</b>	Learn efficient computational procedures to solve optimization problems
	<b>2(B), 2(B-Or)</b>
<b>CO3</b>	Apply optimization concepts to deal with real world situations
	<b>1(A), 2(A), 3(A), 3(A-Or), 3(B), 3(B-Or)</b>
<b>CO4</b>	Design the simulation model for the given case study problem

Blooms Taxonomy	Question List
<b>Remember / Knowledge</b>	1(A)
<b>Understand</b>	1(A), 2(A)
<b>Apply</b>	2(B), 2(B-Or)
<b>Analyze</b>	
<b>Evaluate</b>	3(A), 3(A-Or), 3(B), 3(B-Or)
<b>Higher order Thinking / Creative</b>	