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Total Number of Pages: 02

Course: MBA  
Sub\_Code: 18MBA403D

4<sup>th</sup> Semester Regular/Back Examination: 2023-24  
SUBJECT: Operations Research Applications  
BRANCH(S): BA, FM, FM&HRM, GM, HRM, MBA, MM,  
Time: 3 Hour  
Max Marks: 100  
Q.Code: P119

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 Answer the following questions: (2 x 10)

- Write any two limitations of Operations Research.
- What are Bellman's principles of optimality?
- What do you mean by Pure and Mixed Integer Programming?
- What is the difference between LPP and IPP?
- What do you mean by traffic intensity? How to calculate traffic intensity?
- How is quadratic programming used in the real world?
- What is the standard form of quadratic programming?
- What is the best method of portfolio optimization?
- What is automated bin packing?
- What is an optimal solution for bin packing?

Part-II

Q2 Only Focused-Short Answer Type Questions - (Answer Any Eight out of Twelve) (6 x 8)

- What is Operations Research? Why is it important?
- Explain characteristics of dynamic problem.
- Traffic to a message switching center for one of the outgoing communication lines arrive in a random pattern at an average rate of 240 messages per minute. The line has a transmission rate of 800 characters per second. The message length distribution (including control characters) is approximately exponential with an average length of 176 characters. Calculate
  - Average number of messages in the system
  - Average number of messages in the queue waiting to be transmitted.
  - Average time a message spends in the system.
  - Average time a message waits for transmission
- Briefly explain Beale's algorithm for quadratic programming problem.

e) Find transportation cost using North west corner Method:

Storehouse→ Company↓	A	B	C	D	Supply
1	12	16	14	9	100
2	10	8	11	11	200
3	13	15	14	10	350
Demand	150	250	400	150	

- f) What are the steps involved in Cutting plane algorithm?  
g) What do you mean by IPP? Explain its applications.  
h) Briefly explain Branch Bound Algorithm.  
i) Explain benefits of vehicle routing problem.  
j) What are the different ways to solve vehicle routing problem? Explain.  
k) What is a travelling salesman problem? What are the major challenges of travelling salesman problem  
l) Briefly explain applications of travelling salesman problem.

### Part-III

#### Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** Describe different techniques of Operations Research. **(16)**
- Q4** Solve the following IPP by cutting plane method: **(16)**  
Max  $Z = X + Y$   
Subject to Constraint:  $3X + 2Y \leq 5$   
 $Y \leq 2$   
 $X, Y \geq 0$  and are integer.
- Q5** What is vehicle routing problem? Explain different types of vehicle routing problem. **(16)**
- Q6 a)** Consider the set of 6 processors whose arrival time and burst time are given below: **(8x2)**

Processor ID	A	B	C	D	E	F
Arrival time(min)	0	1	2	3	4	5
Burst time(min)	7	5	3	1	2	2

If the CPU scheduling policy is shortest remaining time first, calculate the average waiting time and average turnaround time.

- b)** Use dynamic programming to solve the following LPP:  
Max  $Z = 3X + 5Y$   
S.C,  $X \leq 4$ ,  $Y \leq 6$ ,  $3X + 2Y \leq 18$ , and  $X, Y \geq 0$