

MASTER OF BUSINESS ADMINISTRATION (CBCS) (2016 COURSE)
M.B.A. Sem - III : SUMMER : 2024
SUBJECT: OPERATIONS RESEARCH

Day : Thursday
Date : 16/05/2024

S-15412-2024

Time : 10:00 AM-01:00 PM
Max. Marks : 60

N.B.:

- 1) Attempt Any Three Questions from Section – I. Each Question carries 10 marks.
- 2) Attempt Any Two Questions from Section – II. Each Question carries 15 marks.
- 3) Both the sections should be written in the Same answer book.
- 4) Use of non – programmable calculator is allowed.
- 5) Allowed to use graph paper wherever necessary.

Section – I

Q. 1

A company produces two products, X and Y. Each unit of X requires 2 units of raw material A and 3 units of raw material B, while each unit of Y requires 1 unit of raw material A and 4 units of raw material B. The company has 80 units of raw material A and 120 units of raw material B available. The profit per unit of X is Rs. 5, and the profit per unit of Y is Rs. 8. How many units of X and Y should the company produce to maximize its profit?

Q. 2

Find an initial basic feasible solution for given transportation problem by using Matrix Minimum method.

	D ₁	D ₂	D ₃	D ₄	Supply
S ₁	11	13	17	14	250
S ₂	16	18	14	10	300
S ₃	21	24	13	10	400
Demand	200	225	275	250	

Q. 3

A department has five employees with five jobs to be performed. The time (in hours) each men will take to perform each job is given in the effectiveness matrix.

		Employees				
		I	II	III	IV	V
Jobs	A	10	5	13	15	16
	B	3	9	18	13	6
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

How should the jobs be allocated, one per employee, so as to minimize the total man-hours?

Q. 4

A dealer sells a particular model of sewing machine for which the probability distribution of daily demand is as given in Table.

Demand/Day	0	1	2	3	4	5
Probability	0.10	0.25	0.20	0.30	0.05	0.10

Simulate the data using following random numbers:

67, 48, 91, 76, 86, 45, 16, 29, 35, 55

Find the average demand of sewing machines.

Q. 5 Write short Notes (Any Two)

- Applications of Operations Research
- Unbalanced Transportation Problem
- Slacks

Section – II

Q. 6

A roller manufacturing company is engaged in producing 3 different kinds of rollers X, Y and Z. These three different rollers are produced at the company's 2 different plants with different production capacities. In a normal 8 hrs working day plant 1 produces 50, 100 and 100 rollers of X, Y and Z respectively. Plant 2 produce 60, 60 and 200 rollers of type X, Y and Z respectively. The monthly demand for roller X, Y and Z is 2,500, 3,000 and 7,000 units respectively. The daily cost of operation of plant 1 and 2 is Rs.2,500 and Rs.3,500 respectively. Find the minimum

number of days of operation per month at 2 different plants to minimize the total costs while meeting the demand.

Q. 7

A Company has 3 production facilities F1, F2 and F3 with production capacity of 70, 90 and 180 units per day of a product, respectively. These units are to be shipped to 4 warehouses W1, W2, W3 and W4 with requirement of 50, 80, 70 and 140 units per day, respectively. The transportation costs (in rupees) per unit between factories to warehouses are given in the table below.

	W ₁	W ₂	W ₃	W ₄	Capacity
F ₁	19	30	50	10	70
F ₂	70	30	40	60	90
F ₃	40	8	70	20	180
Demand	50	80	70	140	

Find initial basic feasible solution for given problem for minimization of total transportation cost and test for the optimality by MODI method.

Q.8

Draw the network diagram from the following activity and find the critical path and total duration of the project.

Activity	Duration (days)
1-2	4
1-3	2
1-4	5
2-3	7
2-5	6
3-5	1
4-5	5

