Code No: E-2223/BL/VO

FACULTY OF MANAGEMENT

M.B.A. (CBCS) III– Semester (Very Old) Examination, August 2023
Subject: Operations Research
Paper- MB-303

Time: 3 Hours **Max. Marks: 80**

.PART – A

Note: Answer all the questions. **(5x4 = 20 Marks)**

1. Dynamic programming
2. Sensitivity analysis
3. Restricted Assignment problem
4. Time-Cost Trade off
5. Applications of simulation

PART – B

Note: Answer all the questions. **(5 x 12 = 60 Marks)**

6. (a) Four products are processed successively on two machines. The machining times in hours per unit of each product are given below:

Machine	Time per Unit(hours)			
	roduct1	roduct2	roduct3	Product4
I	2	3	4	2
II	3	2	1	2

The total cost of producing one unit of each product is based directly on machine time. Cost per hour for machines I and II are Rs.10 and Rs.5 respectively. The total hours available for machines I and II are 500 and 380. If the sale price per unit of products 1, 2, 3 and 4 are Rs.65, 70, 55 and 45 respectively. Formulate as LPP to maximize total net profit.

(OR)

(b) Solve the following LPP using graphical method.

Maximize $Z = 2x_1 + 3x_2$

Subject to constraints: $x_1 - 2x_2 \leq 0$

$2x_1 - x_2 \geq 0$

$x_1 - x_2 \leq 0$

Where $x_1, x_2 \geq 0$

7. (a) Solve the following LPP.

Maximize $Z = x_1 + 2x_2 + 3x_3$

Subject to constraints: $x_1 - x_2 + x_3 \geq 4$

$x_1 + x_2 + 2x_3 \leq 8$

$x_1 - x_2 \geq 0$

Where $x_1, x_2, x_3 \geq 0$

(OR)

(b) Differentiate between Primal versus Dual with suitable examples.

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8. (a) Obtain the optimum solution to the following transportation problem to minimize the total transportation cost . Find IBFS by Vogel's approximation method.

		Destination				
		D1	**D2**	**D3**	**D4**	**Supply**
Origin	**O1**	42	48	38	37	16
	O2	40	49	52	51	15
	O3	39	38	40	43	19
Demand		8	9	11	16	

(OR)

(b) A travelling sales man has to visit 5 cities. The distance between the cities is given in the matrix. Determine the optimum route to reduce the distance travelled.

	A	**B**	**C**	**D**	**E**
	-	0	15	15	0
	0	-	9	14	1
	0	1	-	12	2
	4	0	14	-	5
	2	0	17	19	-

9. (a) Following data refer to a project:

ctivity	**Immediate predecessor**	**ptimistic time (Hrs)**	**Most Likely time(Hrs)**	**Pessimistic time(Hrs)**
A	-	4	6	8
B	-	1	4.5	5
C	A	3	3	3
D	A	4	5	6
E	A	0.5	1	1.5
F	B,C	3	4	5
G	B,C	1	1.5	5
H	E,F	5	6	7
I	E,F	2	5	8
J	D,H	2.5	2.75	4.5
K	G,I	3	5	7

(i) Draw the network diagram
(ii) Calculate the critical path
(iii) Determine the probability of completing the project in 24 hours.

(OR)

(b) Table below gives the time and cost data with respect to normal and crash periods of a project.

ctivity	Immediate predecessor	ormal time (days)	ash time(days)	ormal cost(Rs)	ash cost(Rs)
A	-	20	19	8000	10000
B	-	15	14	16000	19000
C	A	22	20	13000	14000
D	A	17	15	7500	9000
E	B	19	18	4000	5000
F	C	28	27	3000	4000
G	D,E	25	24	12000	13000

10. **(a)** Use dominance rule to find the optimum strategies for both the players.

		PLAYER					
		B1	**B2**	**B3**	**B4**	**B5**	**B6**
PLAYER	**A1**	4	2	0	2	1	1
	A2	4	3	1	3	2	2
	A3	4	3	7	-5	1	2
	A4	4	3	4	-1	2	2
	A5	4	3	3	-2	2	2

(OR)

(b) In a hair dress saloon, with one barber, the customer arrived follows Poisson distribution at an average rate of one in every 45 minutes. The service time is exponentially distributed with a mean of 30 minutes. Find

(i) Average number of customers in saloon
(ii) Average waiting time of customer before service
(iii) Average idle time of barber

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