SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.Com. BIM - END SEMESTER EXAMINATIONS APRIL - 2024
SEMESTER - II
21UBBAT2002 - Elements of Operations Research

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. State the limitations of Operations Research.
2. Describe the steps followed in CPM.
3. Solve the given linear programming problem by graphical method.
   Maximise Z = f(x, y) = 3x + 2y
   Constraints: 2x + y <= 18
   2x + 3y <= 42
   3x + y <= 24
   and x >= 0, y >= 0.
4. Maximize $Z = 2x_1 + 5x_2$
   subject to the conditions $x_1 + 4x_2 \leq 24$
   $3x_1 + x_2 \leq 21$
   $x_1 + x_2 \leq 9$
   and $x_1, x_2 \geq 0$.
   Write the standard form of the given equation by adding slack variables.
5. Determine basic feasible solution to the following transportation problem using North west Corner rule.

		Sinks					**Supply**
		A	**B**	**C**	**D**	**E**	
Origins	**P**	2	11	10	3	7	4
	Q	1	4	7	2	1	8
	R	3	9	4	8	12	9
Demand		3	3	4	5	6	

Contd...

6. Draw the network diagram and determine the critical path for the following project:

Activity	**Time estimate (Weeks)**
1-2	5
1-3	6
1-4	3
2-5	5
3-6	7
3-7	10
4-7	4
5-8	2
6-8	5
7-9	6
8-9	4

7. Three jobs A, B and C one to be assigned to three machines U, V and W. The processing cost for each job machine combination is shown in the matrix given below. Determine the allocation that minimizes the overall processing cost.

		Machine		
		U	V	W
Job	A	17	25	31
	B	10	25	16
	C	12	14	11

8. A furniture dealer deals only two items viz., tables and chairs. He has to invest Rs.10,000/- and a space to store at most 60 pieces. A table cost him Rs.500/– and a chair Rs.200/–. He can sell all the items that he buys. He is getting a profit of Rs.50 per table and Rs.15 per chair. Formulate this problem as an LPP, so as to maximize the profit.

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Solve the given linear programming problems graphically:
   Maximize: $Z = 8x + y$
   Constraints are,
   $x + y \leq 40$
   $2x + y \leq 60$
   $x \geq 0, y \geq 0.$

Contd...

10. A computer centre has got three expert programmers. The centre needs three application programmes to be developed. The head of the computer centre, after studying carefully the programmes to be developed, estimates the computer time in minutes required by the experts to the application programme as follows.

		Programmes		
		P	Q	R
Programmers	1	120	100	80
	2	80	90	110
	3	110	140	120

Assign the programmers to the programme in such a way that the total computer time is least.

11. Use the simplex method to solve the following LP problem.
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) $3x_1 + 2x_2 + 4x_3 \leq 15$ and $x_1, x_2, x_3 \geq 0$.

12. A small project consisting of eight activities has the following characteristics:

Time - Estimates(in weeks)

Activity	**Preceding activity**	**Most optimistic time(a)**	**Most likely time(m)**	**Most pessimestic time(b)**
A	None	2	4	12
B	None	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B,C	9	9	9
G	D	3	3.5	7
H	E,F,G	5	5	5

Draw the PERT network for the project.

13. Ascertain the techniques in Operations Research.

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