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-2023
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. Sketch the characteristics of operations research.

2. Show the modern techniques and applications of operations research.

3. A health enthusiast wishes to mix two types of foods for his diet, in such a way that vitamin content of the mixture contain at least 10 units of vitamin B and 13 units of vitamin C. Food (F1) contains 1 units/kg of vitamin B and 2 unit/kg of vitamin C. Food (F2) contains 2 unit/kg of vitamin B and contains 1 unit/kg of vitamin C. F1 costs Rs.60/kg and F2 costs Rs.80/kg. Frame LPP equations in order to minimize the cost of the mixture.

4. A transportation problem is provided below:

		Destination					Supply
		D1	D2	D3	D4	D5	
	F1	5	1	8	7	5	15
Source	F2	3	9	6	7	8	25
	F3	4	2	7	6	5	42
	F4	7	11	10	4	9	35
Demand		30	20	15	10	20	

Identify the type of transportation and brief the first step to solve the problem using any method.

5. What is a non-degenerate solution? Illustrate.

6. What are the network models for project analysis? Brief.

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1

7. Calculate the total expected time for the following time-estimates (in weeks):

Activity	Preceding activity	Optimistic time	Most likely time	Pessimistic time
A	-	2	4	12
B	-	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

8. Ascertain the purpose of payoff matrix. Illustrate.

Section C

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

9. Describe the nature and scope of Operations Research in the modern business world.

10. A company produces two types of TVs, one of which is black and white, the other colour. The company has the resources to make at most 200 sets a week. Creating a black and white set includes Rs.2,700 and Rs.3,600 to create a colored set. The business should spend no more than Rs.6,48,000 a week producing TV sets. If it benefits from Rs.525 per set of black and white and Rs.675 per set of colours, how many sets of black/white and colored sets it should produce in order to get maximum profit? Formulate this using LPP.

11. Obtain initial feasible solution for the following Transportation table using
    (i) North West Corner rule.
    (ii) Least Cost Method.
    (iii) VAM Method.

		Destination			
		D1	D2	D3	**Supply**
	F1	2	7	4	5
Source	F2	3	3	1	8
	F3	5	4	7	7
	F4	1	6	2	14
Demand		7	9	18	

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

Activity	Preceding Activity	Most Optimistic Time	Most Likely Time	Most Pessimistic Time
A	-	4	5	12
B	-	1	1.5	5
C	A	2	3	4
D	A	3	4	11
E	A	2	3	4
F	C	1.5	2	2.5
G	D	1.5	3	4.5
H	B,E	2.5	3.5	7.5
I	H	1.5	2	2.5
J	F,G,I	1	2	3

Determine the critical path.

13. Solve the following pay-off matrix:

		Player B			
	Strategies	I	II	III	IV
Player A	I	1	7	3	4
	II	5	6	4	5
	III	7	2	0	3

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