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.Sc.(Statistics) - END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - IV
20USTCT4008 - Operations Research

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

Section B

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

1. Explain the characteristics of a good model in Operations Research.
2. Describe the steps involved in solving an Assignment problem.
3. A machine operator has to perform two operations, turning and threading, on a number of different jobs. The time required to perform these operations in minutes for each job is given. Compute the order in which the jobs should be processed in order to minimize the total time required to turn out all the jobs.

Jobs	1	2	3	4	5	6
Time for Turning (in min)	3	12	5	2	9	11
Tune for threading (in min)	8	10	9	6	3	1

4. Explain the following terms:
   i)Optimistic Time ii) Pessimistic Time and iii) Likely Time
5. What is degeneracy? How do you overcome degeneracy in transportation problem?
6. Five salesmen are to be assigned to five districts. Estimates of sales revenue (in thousands) for each salesman are given as follows:

	Districts					
Salesman		A	B	C	D	E
	1	32	38	40	28	40
	2	40	24	28	21	36
	3	41	27	33	30	37
	4	22	38	41	36	36
	5	29	33	40	35	39

Compute the assignment pattern that maximizes the sales revenue.

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7. Consider the game G with the following payoff

	B		
A		I	II
	I	2	6
	II	-2	P

Show that G is strictly determinable, whatever the value of P may be and Find the value of P.

8. State the difference between CPM and PERT.

Section C

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

9. Raju have inherited Rs. One lakhs from his father-in-law that can be invested in a combination of only two stock portfolios, with the maximum investment allowed in either portfolio set at Rs. 75,000. The first portfolio has an average rate of 10%, whereas the second has 20%. In terms of risks factors associated with these portfolios, the first has a risk rating of 4 and second has 9. Since he wishes to maximize his return, he will not accept an average rate of return below 12% or a risk factor above 6. Hence, he faces the important question. How much should be invest in each portfolio?
Convert above as a linear programming problem and solve it by graphical method.

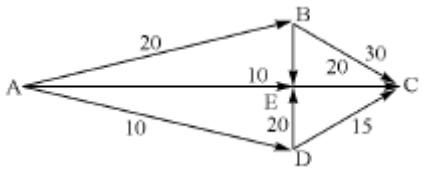
10. A Company has 3 production facilities S1, S2 and S3 with production capacity of 7, 9 and 18 units (in 100's) per week of a product, respectively. These units are to be shipped to 4 warehouses D1, D2, D3 and D4 with requirement of 5,8,7 and 14 units (in 100's) per week, respectively. The transportation costs (in rupees) per unit between factories to warehouses are given in the table below.

	D1	D2	D3	D4
S1	19	30	50	10
S2	70	30	40	60
S3	40	80	70	20

Compute the initial basic feasible solution for the given problem using
(a) North – West corner method,
(b) Least cost method
(c) Vogel's approximation method.

Contd...

11. A tourist organization is planning to arrange a tour to 5 historical places. Starting from the head office at A then going round B, C, D and E and then come back to A. A, B, C, D and E as the shown in the figure. The numbers on the arrows show the distances in Km



Their objective is to minimize the total distance covered. Help them by solve it using travelling salesman problem.

12. Solve the given payoff matrix by graphical method and state optimal strategies of players A and B.

	Player A					
Player B		1	2	3	4	5
	1	-5	5	0	-1	8
	2	8	-4	-1	6	-5

13. The following table gives the activities of a construction project and duration.

Activity	1-2	1-3	2-3	2-4	3-4	4-5
Duration	20	25	10	12	6	10

Find critical path and project duration.

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