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B.B.A. IIIrd Semester (0023) Examination

0874

OPERATION RESEARCH

Paper : BBA 202

Time : 3 Hours]

[Maximum Marks : 80

Note :- Attempt any *four* questions from Section A. Each question carries 5 marks. Attempt *two* questions each from Section-B and Section-C. Each question carries 15 marks.

Section-A

1. Explain the following terms in relation to Linear Programming Problem :

- (a) Feasible solution
- (b) Unbounded problem

2. What is degeneracy in transportation problem ? How can it be resolved ?
3. Find the initial basic feasible solution to the following transportation problem by LCEM.

From \ To	F ₁	F ₂	F ₃	Supply
W ₁	2	7	4	5
W ₂	3	3	1	8
W ₃	5	4	7	7
W ₄	1	6	2	14
Demand	7	9	18	

4. Solve the game :

		B	
	4	-4	
A	-4	4	

5. Vitamins A and B are available in two different foods P and Q. One unit of P contains 2 units of vitamin A and 3 units of vitamin B. One unit of Q contains 5 units of vitamin A and 4 units of vitamin B. The minimum daily consumption of vitamin A and B should be 1000 and 1500 units respectively. One unit of P costs Rs. 5 and one unit of Q costs Rs. 6. What should be the intake of P and Q in order to minimise cost ?

6. Four jobs are to be done on four different machines. The cost (in rupees) of processing i th job on j th machine is given below :

		Machines			
		M_1	M_2	M_3	M_4
Jobs	J_1	15	11	13	15
	J_2	17	12	12	13
	J_3	14	15	10	14
	J_4	16	13	11	17

Assign the jobs to different machines so as to minimise the cost.

Section-B

7. Explain the significance and scope of operations research.
8. A company produces two types of Pens, say Pen A and Pen B. Pen A is superior quality and Pen B is of lower quality. Profit on Pens A and B is Rs. 5 and Rs. 3 per pen respectively. Raw material required for each Pen A is twice as that for Pen B. The supply of raw material is sufficient only for 1000 pens of Pen B per day. Pen A requires a special clip and only 400 such clips are available per day. For Pen B only 700 clips are available per day. Find graphically the product mix so that the company can make maximum profit.

9. A company has four vehicles to be run on four routes. The distance (kms) for each route and the kms run per litre of diesel for each vehicle in each of the routes are given below :

	Kms per litre			
	I	II	III	IV
A	4.0	5.0	5.0	3.0
B	4.5	6.0	5.0	3.5
C	5.0	5.5	6.0	4.0
D	4.8	5.8	5.5	3.0
Distance	200	300	250	150

Which vehicle should be assigned to which route in order to minimize the total consumption of diesel by all the four vehicles ?

10. At the beginning of sowing season, there will be surplus of 6, 9, 7 and 5 tractors in four villages A, B, C and D while three other villages (X, Y and Z) will require 8, 7 and 12 tractors respectively for farming purposes. The cost of moving tractors is directly proportional to the distance between the surplus and deficit villages and these distances (in kms) are given below :

		Deficit villages		
		X	Y	Z
Surplus villages	A	26	22	28
	B	19	27	16
	C	39	21	32
	D	18	24	23

Determine the optimal scheme for delivery of tractors from surplus to deficit villages.

Section-C

11. At a service centre customers arrive at the rate of 10 per hour and are served at the rate of 15 per hour. Their arrival follows Poisson distribution and service is exponentially distributed. Find the average length and average waiting time in the system.
12. Determine the sequence for the five jobs that will minimize the elapsed time and also find idle time :

Processing time (in hours)

Jobs	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

13. Solve the following game :

		B	
		I	II
A	I	2	4
	II	2	3
	III	3	2
	IV	-1	6

14. Explain M/M/I and M/M/S queuing models in detail.