V Semester B.B.A. Examination, February/March 2024
(NEP) (Freshers)
AVIATION MANAGEMENT
Paper – 5.1 : Operation Research

Time : 2½ Hours

Max. Marks : 60

Instruction : *Answers should be written in **English** only.*

SECTION – A

Answer **any six** sub-questions. **Each** sub-question carries **2** marks : (6×2=12)

1. a) Define operation research.

   b) What do you mean by basic feasible solution ?

   c) What is meant by 2 person game ?

   d) What is meant by float ?

   e) Expand CPM and PERT.

   f) What do you mean by replacement theory ?

   g) State any two features of operation research.

   h) What are the different methods of solving transportation problem ?

SECTION – B

Answer **any three** questions. **Each** question carries **4** marks : (3×4=12)

2. A company produces two types of leather belts, type-A and type-B. Profits on two types of belts are Rs. 40 and Rs. 30 respectively per belt. Each belt of type-A requires twice as much time required for a belt of type-B and the company could produce 1000 belts per day. But the supply of leather is sufficient only for 800 belts per day. Belt of type – 'A' requires a fancy buckle and only 400 fancy buckles are available for this, per day. For belt of type-B, only 700 buckles are available per day.

   Formulate the problem as LPP.

3. Given below is the transportation cost per unit for transporting goods from origin to destinations. Find out the initial basic feasible solution and transportation cost using NWCR method.

DESTINATIONS

		D1	D2	D3	SUPPLY
ORIGIN	O1	8	4	12	500
	O2	10	5	6	200
	O3	7	5	3	100
	DEMAND	400	200	200	

4. A machine cost Rs. 9,000, its annual maintenance cost is Rs. 200 for the 1st year and thereafter it increases by Rs. 2,000 every year for the next 4 years.

   Determine the best age at which the machine to be replaced. Do not consider the scrap value.

5. Determine the value of the game from the following payoff matrix.

Player B

		1	2
Player A	1	5	1
	2	3	4

6. Draw a network diagram for the following project.

Jobs	A	B	C	D	E	F	G	H	I
Predecessors	–	–	–	A	B	C	D, E	B	H, F

SECTION – C

Answer **any three** questions. **Each** question carries **12** marks : (3×12=36)

7. Solve the following LPP by graphical method.

   Max $Z = 3x + 10y$

   s. t $x + y \leq 4$

   $\quad 2x + y \leq 6$

   and $x, y \geq 0$.

8. Determine the optimal solution and total processing cost for the following assignment problem.

OPERATORS

	A	B	C	D
1	10	20	18	14
2	15	25	9	25
3	30	19	17	12
4	19	24	20	10

(JOBS)

9. Consider the payoff matrix of player A as shown below. Solve the game optimally using graphical method.

Player B

	1	2	3	4	5
1	– 4	2	5	– 6	6
2	3	– 9	7	4	8

Player A

10. Draw the network and determine the critical path for the given data. Also calculate all the floats involved in CPM.

Activity	1 – 2	1 – 3	2 – 4	3 – 4	3 – 5	4 – 9	5 – 6	5 – 7	6 – 8	7 – 8	8 – 10	9 – 10
Duration	4	1	1	1	6	5	4	8	1	2	5	7

11. The following table shows the jobs of PERT network with their time estimates in days.

Job	Duration		
i-j	Optimistic	Most likely	Pessimistic
1-2	3	6	15
1-6	2	5	14
2-3	6	12	30
2-4	2	5	8
3-5	5	11	17
4-5	3	6	15
6-7	3	9	27
5-8	1	4	7
7-8	4	19	28

a) Draw the project network.

b) Calculate the length and variance of the critical path.

c) What is the approximate probability that the jobs on the critical path will be completed in 41 days ?

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