

Bachelor of Business Administration (BBA) Examination  
IV Semester

**Operations Research**

Time : 3 Hours ]

[ Max. Marks : 80

**Note : Attempt any three questions from Section A. Each question in this section carries 16 marks. Attempt any two questions from Section B. Each question in this section carries 16 marks.**

**Section A**

1. Operation Research is the "art of winning war without actually fighting them." Justify.
2. What are the assumptions of LPP ?
3. (a) What are the conditions of feasibility in transportation model ?  
(b) What do you understand by degeneracy in transportation model?
4. (a) What is critical path in a Network model ?  
(b) What do you understand by dummy activity ?  
(c) Give one application of Network model.
5. What is the difference between group replacement and individual replacement ? Under which circumstances group replacement may become profitable ?

**Section B**

6. Consider the project schedule has the following characteristics :

Activity	Optimistic Time	Most Likely Time	Pessimistic Time
1-2	1	2	3
2-3	1	2	3
2-4	1	3	5
3-5	3	4	5
4-5	2	3	4
4-6	3	5	7
5-7	4	5	6
6-7	6	7	8
7-8	2	4	6

Construct the network and find out :

- (a) Earliest possible time to complete the different stages of the project.
- (b) The latest allowable time for them.
- (c) The critical path.

7. Distances between six islands in the Indian Ocean are given in the table :

	A	B	C	D	E	F
A	-	120	90	100	110	160
B	120	-	190	200	210	270
C	90	190	-	30	40	90
D	100	200	30	-	30	80
E	110	210	40	30	-	70
F	160	270	90	80	70	-

It is proposed to lay submarine cable of smallest length to connect all the islands by telephone connections. Find the minimum spanning tree for the six islands mentioned.

8. Solve by simplex method and comment on the type of solution :

Minimize  $z = x - 3y$

Subject to constraint  $x + y \leq 300$

$x - 2y \leq 200$

$2x + y \geq 100$

$x, y \geq 0.$

9. The costs per year of maintaining a machine whose purchase is Rs. 1,60,000 are as follows :

Year	Maintenance costs Rs	Resale price Rs.
1	8,000	1,45,000
2	9,000	1,32,000
3	10,500	1,22,000
4	13,000	1,14,000
5	15,000	1,09,000
6	20,000	90,000
7	25,000	70,000
8	30,000	50,000

At what age a replacement is due?

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