

Roll No.

Total No. of Pages : 03

Total No. of Questions : 07

MBA (2009 to 2011) (Sem.-3rd)

APPLIED OPERATIONS RESEARCH

Subject Code : MB-301

Paper ID : [C0197]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **SIX** questions carrying **TEN** marks each and students has to attempt any **FOUR** questions.

SECTION-A

1. Answer briefly :

- (a) Differentiate between Slack and Artificial Variables.
- (b) Define Trans-shipment Problem.
- (c) Define the terms Balking, Jockeying and Holiday Time in queue system.
- (d) Distinguish between Ordering Cost and Carrying Cost.
- (e) Differentiate between Individual Replacement Policy and Group Replacement Policy.
- (f) Primal-Dual Relationship.
- (g) Dominance principle in game theory.
- (h) Explain the terms Interference float and Independent float.
- (i) Hurwicz criterion.
- (j) Bellman's principle of optimality.

SECTION-B

2. Explain the concept, scope and methodology of Operation Research as applicable to business and Industry. (10)

3. Maximize $Z = 6x_1 + 10x_2 + 2x_3$
s.t. $2x_1 + 4x_2 + 3x_3 \leq 40$;
 $x_1 + x_2 \leq 10$;
 $2x_2 + x_3 \leq 12$ and $x_1, x_2, x_3 \geq 0$ (10)

4. (a) The ABC tool company has a sales force of 25 men who work out from three Regional offices. The company produces four basic product lines of hand tools. Mr. Jain, sales manager feels that 6 salesmen are needed to distribute product line 1; 10 salesmen to distribute product line 2; 4 salesmen to product line 3; and 5 salesmen to product line 4. The cost (in Rs.) per day of assigning salesmen from each of the offices for selling each of the product lines are as follows :

Regional Office	Product Lines			
	1	2	3	4
A	20	21	16	18
B	17	28	14	16
C	29	23	19	20

At the present time, 10 salesmen are allotted to office A, 9 salesmen to office B and 7 salesmen to office C. How many salesmen should be assigned from each office to selling each product line in order to minimize costs ?

- (b) Five men are available to do five different jobs. From past records, the time in (hrs.) that each man takes to do a job is known and is given in the following matrix :

Men	Jobs				
	I	II	III	IV	V
A	2	9	2	7	1
B	6	8	7	6	1
C	4	6	5	3	1
D	4	2	7	3	1
E	5	3	9	5	1

Find the assignment of men to jobs that will minimise the total time taken.
(5, 5)

5. (a) Why inventory is maintained ? Give uses and abuses of maintaining inventory.

(b) Solve the 3×4 game given below graphically.

	B ₁	B ₂	B ₃	B ₄	
A ₁	4	-2	3	-1	(5, 5)
A ₂	-1	2	0	1	
A ₃	-2	1	-2	0	

6. Consider the following schedule of activities and related information for the construction of a new plant :

Activity	Expected Time		Expected Cost Rs. 00,000's
	Months	Variance	
1-2	4	1	5
2-3	2	1	3
3-6	3	1	4
2-4	6	2	9
1-5	2	1	2
5-6	5	1	12
4-6	9	5	20
5-7	7	8	7
7-8	10	16	14
6-8	1	1	4

Assuming that cost and time required for one activity are not dependent upon cost and time of any other activity and variations are expected to follow normal distribution, calculate :

(a) Critical path; (b) Expected cost of construction of plant; (c) expected time required to build plant; (d) Standard deviation of expected time.

(10)

7. Write short notes on **any two** :

(a) Decision Tree Analysis

(b) Sensitivity Analysis

(c) Replacement Models.

(5, 5)