(i) Printed Pages : 6 Roll No. .....

(ii) Questions : 14 Sub. Code : 1 7 8 7 4

Exam. Code : 0 0 2 3

Bachelor of Business Administration 3rd Semester

(2124)

OPERATION RESEARCH

Paper : BBA 202

Time Allowed : Three Hours] **[Maximum Marks : 80**

Note :— (1) Attempt any ***four*** questions from Section-A. Each question carries **5** marks.

(2) Attempt any ***two*** questions from Section-B. Each question carries **15** marks.

(3) Attempt any ***two*** questions from Section-C. Each question carries **15** marks.

SECTION—A

1. Describe briefly the significance of Operations Research.
2. What do you mean by 'infeasible solution' in L.P.P. ?
3. A firm makes two types of furniture; chairs and tables. The contribution to profits for each product calculated by the accounting department is Rs. 20 per chair and Rs. 30 per table.

Both products are to be processed on three machines M1, M2 and M3. The time required in hours per week on each machine are as follows :

Machine	Chair	Table	Available Time
M1	3	3	36
M2	5	2	50
M3	2	6	60

Give a mathematical formulation to this Linear Programming Problem.

4. In a game of matching coins with two players, suppose A wins one unit of value when there are two heads, wins nothing when there are two tails and loses ½ unit of value when there are one head and one tail. Determine the pay off the matrix, the best strategies for each player and the value of game.

5. Find the Initial Basic Feasible Solution to the following transportation problem by using Lowest Cost Entry method :

		Destination				
		D1	D2	D3	D4	Supply
Factory	F1	1	2	1	4	20
	F2	3	3	2	1	40
	F3	4	2	5	9	20
	F4	5	3	6	10	20
Requirement		20	40	30	10	100

6. Five Jobs are to be processed on two machines A and B in the order AB. Processing time (in hours) are given below :

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

Determine the optimal sequence that will minimize the total elapsed time. Calculate the total elapsed time and idle time for both machines.

SECTION—B

7. Describe meaning and scope of Operation Research. Also explain the methodology of Operation Research.

8. Solve the following LPP problem with Simplex Method :

$$\text{Min. } Z = 60x + 80y$$

Subject to $20x + 30y \geq 900$

$$40x + 30y \geq 1200$$

Where $x, y \geq 0$

9. Find out the minimum cost solution for the following transportation problem which has cost structure as :

		A	B	C	Supply
From	P	16	19	12	14
	Q	22	13	19	16
	R	14	28	8	12
Demand		10	15	17	

10. Jio has five plants each of which can manufacture any one of five products. Production cost differs from one plant to another as does sales revenue. Given the revenue and cost data below, obtain which product each plant should produce to maximize profit. Apply Assignment Problems technique :

Sales Revenue in Rs.

	Product 1	Product 2	Product 3	Product 4	Product 5
Plant A	65	78	83	60	95
Plant B	85	52	59	44	73
Plant C	83	56	69	64	78
Plant D	49	80	85	84	73
Plant E	59	68	83	74	83

Production Cost in Rs.

	Product 1	Product 2	Product 3	Product 4	Product 5
Plant A	33	40	43	32	45
Plant B	45	28	31	23	37
Plant C	42	29	36	29	41
Plant D	27	42	44	38	37
Plant E	30	35	43	39	44

SECTION—C

11. Solve the following game by Dominance Method and find the value of game and optimum strategies :

		Player B			
		I	II	III	IV
Player A	I	6	4	8	0
	II	6	8	4	8
	III	8	4	8	0
	IV	0	8	0	16

12. Time requirement for the various activities of a project is as follows :

		Duration (days)		
Activity	Predecessor Activity	Most likely	Optimistic	Pessimistic
A	—	5	4	6
B	—	12	8	16
C	A	5	4	12
D	B	3	1	5
E	D,A	2	2	2
F	B	5	4	6
G	C,E,F	14	10	18
H	G	20	18	34

You are required to find :

(i) Draw the network diagram and find critical path.

(ii) Expected duration and variance of each activity.

(iii) Expected project length.

(iv) Variance and standard deviation of project length.

13. What do you mean by sequencing problem ? Explain its assumptions. Explain the method of processing 'n jobs' through two machines with suitable example.

14. Write notes on the following :

(a) What is critical path ? Why it is important in scheduling and controlling large projects ? 8

(b) Explain the various types of strategies used in Game theory. 7