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

(ii) Questions : 14 Sub. Code : 0 8 7 4

Exam. Code : 0 0 2 3

Bachelor of Business Administration 3rd Semester

(2123)

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. Define Operations Research.
2. Differentiate PERT and CPM.
3. Find the initial feasible solution of the following transportation problem by Vogel's Approximation Method :

	Destination				
Source	**D1**	**D2**	**D3**	**D4**	**Availability**
A	19	30	50	12	7
B	70	30	40	60	10
C	40	10	60	20	18
Requirement	5	8	7	15	

4. A manufacturing company processes 5 different jobs on two machines A and B. The processing times on A and B Machines are given in table. Find the optimal sequence, the total minimum elapsed time and idle time for each machine.

Job No.	Processing Time	
	Machine A (Minutes)	Machine B (Minutes)
1	7	4
2	3	8
3	11	9
4	5	10
5	12	6

5. Minimize : $Z = 2x + 3y + 4z$

Subject to : $3x + y + 4z \leq 600$

$2x + 4y + 2z \geq 480$

$2x + 3y + 3z = 540$

where x, y and $z \geq 0$

Convert the LPP into standard LPP by introducing Slack, Surplus and Artificial Variables.

6. Two players match coins. If the coin match, then A wins two points, if the coin do not match then B wins two points. Determine the payoff matrix optimal strategies for two players and the value of game.

SECTION—B

7. Describe the significance, scope and limitations of Operations Research.

8. What is meant by unbalanced transportation problem ? How can it be converted into balanced transportation problem ? Explain the method of solving such a problem with a suitable example.

9. A company manufactures two type of furniture : chairs and tables. The profit for each accounting department is rupees 20 per chair and rupees 30 per table. Both products are to be processed on three machines M1, M2 and M3. The time required in hours by each product and total time available in hours per week on each machine is as follows :

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

How should the manufacturer schedule his production in order to maximize profit ? Use graphical method to solve the problem.

10. A solicitors' firm employs typist on hourly piece-rate basis for their daily work. There are five typists and their charges and speed are different. According to an earlier understanding only one job is given to one typist and the typist is paid for full hour

even if he works for a fraction of an hour. Find the least cost allocation for the following data :

Typist	Rate per hour (Rs.)	No. of Pages typed/hour	Job	No. of Pages
A	5	12	P	199
B	6	14	Q	175
C	3	8	R	145
D	4	10	S	298
E	4	11	T	178

SECTION—C

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

		Player B			
		I	II	III	IV
Player A	I	2	–2	4	1
	II	6	1	12	3
	III	–3	2	0	6
	IV	2	–3	7	1

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

		Duration (days)		
Activity	**Job**	**Optimistic**	**Most likely**	**Pessimistic**
A	1—2	6	6	24
B	1—3	6	12	18
C	1–4	12	12	30
D	2–5	6	6	6
E	3—5	12	30	48
F	4—6	12	30	42
G	5–6	18	30	54

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 is sequencing problem ? Explain its assumptions. Explain the method of processing 'n jobs' through two machines.

14. Write notes on the following :—

(a) Explain the term 'Crashing' along with its importance under PERT & CPM. 7

(b) Describe some applications of game theory. What are its limitations ? 8