(i) Printed Pages : 4 Roll No. .....

(ii) Questions : 9 Sub. Code : 0 8 5 6

Exam. Code : 1 1 2 5

B.B.A. 3rd Semester

1125

OPERATIONAL RESEARCH

Paper : BBA-202

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

Note :– Attempt any **four** parts of question No. **1** of Section A. Each carries **5** marks. Attempt **two** questions each from Section B and Section C. Each carries **15** marks.

SECTION–A

I. (a) What are the assumptions of sequencing problems ? 5

(b) Solve the game :

		P_2	
		b_1	b_2
P_1	a_1	5	1
	a_2	3	4

5

(c) The Manager of an oil refinery must decide on the optimal mix of two possible blending processes of which the inputs and outputs per production run are as follows :

Process	Inputs (Units)		Outputs (Units)	
	Crude A	Crude B	Gasoline X	Gasoline Y
1	5	3	5	8
2	4	5	4	4

The Maximum amounts available of Crude A and B are 200 units and 150 units respectively. Market requirements show that at least 100 units of Gasoline X and 80 units of Gasoline Y must be produced. The profits per production run from process 1 and process 2 are Rs. 300 and Rs. 400 respectively. Formulate L.P. model. 5

(d) What is the significance of Operations Research ? 5

(e) Solve Initial Basic Feasible solution by NWCM :

Destination

		S	T	U	SS
Source	P	8	6	3	60
	Q	5	10	9	50
	R	6	6	4	70
	DD	30	105	45	180

5

(f) Find the assignment of men to jobs that will minimise the total time.

Jobs

		J_1	J_2	J_3	J_4
Men	M_1	8	26	17	11
	M_2	13	28	4	26
	M_3	38	19	18	15
	M_4	19	26	24	10

5

SECTION–B

II. Explain Hungarian Assignment Method to solve an assignment problem. 15

III. Solve the following LPP graphically :

Maximise $Z = 8000x_1 + 7000x_2$

subject to $3x_1 + x_2 \leq 66$

$x_1 + x_2 \leq 45$

$x_1 \leq 20, \quad x_2 \leq 40$

$x_1, x_2 \geq 0.$ 15

IV. Solve the following transportation problem by VAM and use MODI Method to check optimality.

Warehouses

Plants	X	Y	Z	SS
A	7	5	4	70
B	8	6	3	50
C	9	5	6	60
DD	20	120	40	180

15

V. A captain of a cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows :

Batting Positions

Batsmen	III	IV	V	VI	VII
A	40	40	35	25	50
B	42	30	16	25	27
C	50	48	40	60	50
D	20	19	20	18	25
E	58	60	59	55	53

15

SECTION–C

VI. Use graphical method to minimise the time needed to process the following jobs on Machines shown i.e. for each machine find the job which should be done first. Also calculate the total elapsed time to compute both jobs :

Job 1		Job 2	
Machine Sequence	Time (hrs)	Machine Sequence	Time (hrs)
A	3	B	5
B	4	C	4
C	2	A	3
D	6	D	2
E	2	E	6

15

VII. Solve the game whose pay-off matrix is :

	B		
	–1	–2	8
A	7	5	–1
	6	0	12

15

VIII. A television repairman finds that the time spent on his job has an exponential distribution with a mean of 30 minutes. If the repairs sets in the order in which they came in and if the arrival of sets follows a Poisson distribution approximately with an average rate of 10 per hour day, what is the repairman's expected idle time each day ? How many jobs are ahead of the average set just brought in ?

15

IX. Explain :

(a) Saddle point

(b) Value of the game

(c) Mixed strategy and Pure strategy in the theory of games.

5,4,6