647510 **BBAopeEC537D** **Seat No :_____**

B.B.A. Semester - 5 (*CBCS*) Examination

Oct/Nov. - 2023(Old Course)

STATISTICS GROUP: FUNDAMENTALS OF OPERATION RESEARCH (ELECTIVE)

Time: 2:30 Hours **Marks: 70**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Que.1(A) Give any 3 definitions of operations research. (07)

Que.1(B) Explain characteristics of O.R. (07)

OR

Que.1 What is operations research? Explain with merits and limitations. (14)

Que.2(A) What is linear programming problem? (07)

Que.2(B) Give difference between simplex method and graphic method. (07)

OR

Que.2 A production manager wants to determine the quantity to be produce per month of products A and B manufactured by his firm. This data on resources required, availability of resources, and the contribution from sale of each product are given in the following table. (14)

	Requirements		Capacity available per month
	Product A	Product B	
Raw material (kg)	60	120	12,000
Machining (hours per pieces)	8	5	600
Assembly (man)	3	4	500

The contribution per pieces of product A is rs.30 and that of product B is rs.40. the objective of the production manager is to maximize contribution. Solve the problem graphically.

Que.3(A) Explain simplex method. (07)

Que.3(B) Define the following (i) slack variables (II) surpluses variable (ii) artificial variable. (07)

OR

Que.3 Solve the following liner programming problem by simplex method. (14)

Maximum $Z= 3x_1+ 4x_2$

Subject to constraint

$2x_1+3x_2 \leq 6$

$x_1+2x_2 \leq 20$

$x_1, x_2 \geq 0$

Que.4(A) What is transportation problem? (07)

Que.4(B) Find initial solution of given transportation by vogel's approximation method. (07)

	D_1	D_2	D_3	D_4	availability
O_1	19	30	50	12	7
O_2	70	30	40	60	10
O_3	40	10	60	20	18
Demand	5	8	7	15	35/35

OR

Que.4 Find optimum solution of given transportation problem. (14)

Plant	W_1	W_2	W_3	W_4	W_5	availability
P_1	20	28	32	55	70	50
P_2	48	36	40	44	25	100
P_3	35	55	22	45	48	150
requirement	100	70	50	40	40	300/300

Que.5(A) What is assignment problem? Explain it. (07)

Que.5(B) A computer Centre has got four expert programmers. The Centre needs four application programmers to be developed. The head of the computer Centre, after studying carefully the programmers to be developed, estimates the computer time (in minutes) required by the respective experts to be developed the application programmers as follows. (07)

	Programmes				
Programmers.		A	B	C	D
	1	120	100	80	90
	2	80	90	110	70
	3	110	140	120	100
	4	90	90	80	90

OR

Que.5 Solve the following unbalance assignment problem of minimizing total time for doing all jobs. (14)

	Job				
Operator	J_1	J_2	J_3	J_4	J_5
O_1	6	2	5	3	6
O_2	2	5	8	7	7
O_3	7	8	6	9	8
O_4	6	2	3	4	5
O_5	9	3	8	9	7
O_6	4	7	4	6	8

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