RW-161100010510 Seat No. _____

B. B. A. (Sem. V) (CBCS) (W.E.F. 2016) Examination

March - 2019

Statistics

(GRP : Fundamentals of Operations Research)

(New Course)

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) All questions are compulsory.
(2) Marks are indicated on right side.
(3) Q. 1 to Q.5 each carries 14 marks.

1 Explain the methodology of O.R. **14**

OR

1 (a) What is O.R. ? State its characteristics. **7**

(b) Discuss the applications of O.R. **7**

2 (a) Explain the Hungarian method of solving an A.P. **7**

(b) A travelling salesman has to visit 4 cities. He wishes to start from a particular city. Visit each city once and then return to his starting point. The travelling cost (in Rs.) of each city from a particular city is given below : **7**

	To City			
	A	*B*	*C*	*D*
From City *A*	-	15	25	20
B	22	-	45	55
C	40	30	-	25
D	20	26	38	-

What is the sequence of visit of the salesman so that the cost is minimum ? Also find minimum cost.

OR

2 You are given the information about the cost of performing jobs by different persons. The job person marking X indicates that the individual involved cannot perform the particular job. Using this information, state (i) The optimal assignment of jobs, (ii) The cost of such assignment. **14**

		Job				
		J_1	J_2	J_3	J_4	J_5
Person	P_1	27	18	X	20	21
	P_2	31	24	21	12	17
	P_3	20	17	20	X	16
	P_4	22	28	20	16	27

3 (a) Explain the differences between a T.P. and an A.P. **7**

(b) Obtain an initial basic feasible solution of the following T.P. by using (i) N-W corner rule (ii) Matrix Minima method : **7**

		Ware House				
		W_1	W_2	W_3	W_4	Capacity
Factory	F_1	21	16	25	13	11
	F_2	17	18	14	23	13
	F_3	32	27	18	41	19
Requirement		6	10	12	15	

OR

3 Solve the following transportation problem. **14**

Per unit cost (in Rs.)

		Destination				
		A	*B*	*C*	*D*	Supply
Origin	*X*	19	30	50	12	7
	Y	70	30	40	60	10
	Z	40	10	60	20	18
Demand		5	8	7	15	

4 (a) What is L.P.P. ? Explain general mathematical formation of L.P.P. **7**

(b) Explain the graphical method of solving a L.P.P. **7**

OR

4 Solve the following L.P.P. using graphical method : **14**

Max. $Z = 2x_1 + x_2$

Sub. to $x_1 + 2x_2 \leq 10$

$x_1 + x_2 \leq 6$

$x_1 - x_2 \leq 2$

$x_1 - 2x_2 \leq 1$

$x_1, x_2 \geq 0$

5 (a) Define : **7**

(1) Slack Variable (2) Surplus variable

(3) Unbounded solution

(b) Write dual of the following L.P.P. **7**

Max. $Z = 5x_1 + 8x_2 + 3x_3$

Sub. to $2x_1 - x_3 \leq 6$

$x_1 + 5x_2 \leq 10$

$2x_1 + x_2 - 2x_3 = 8$

$x_1, x_2, x_3 \geq 0$

OR

5 Solve the following L.P.P. using simplex method. **14**

Max. $Z = 10x + 15y + 8z$

Sub. to $x + 2y + 2z \leq 90$

$2x + y + z \leq 150$

$3x + y + 2z \leq 70$

$x, y, z \geq 0$