B.Sc. (Part—III) Semester—VI Examination
6S : STATISTICS

Time : Three Hours] [Maximum Marks : 80

Note :— All questions are compulsory.

1. (A) Fill in the blanks :— 2

(i) The optimum solution of LPP occurs at _____ of feasible region.

(ii) When two competitors play game then it is called _____ game.

(iii) In LSD, number of rows, columns and number of treatments are _____.

(iv) For the design with b blocks and v treatments, the total number of experimental units required are _____.

(B) Choose the correct alternative from the following :— 2

(i) In LPP, the function to be optimized is known as _____.

(a) Constraint (b) Restriction

(c) Objective function (d) None of these

(ii) In balanced transportation problem _____.

(a) $\Sigma a_i > \Sigma b_j$ (b) $\Sigma a_i < \Sigma b_j$

(c) $\Sigma a_i \neq \Sigma b_j$ (d) $\Sigma a_i = \Sigma b_j$

(iii) The principles of _____ are used in CRD.

(a) local control and randomisation (b) local control and replication

(c) randomisation and replication (d) None of the above

(iv) LSD is incomplete _____ layout.

(a) two way (b) three way

(c) four way (d) None of these

(C) Answer in **ONE** sentence each :— 4

(i) Define contrast

(ii) What is replication ?

(iii) What is payoff ?

(iv) Define imbalanced transportation problem.

2. (A) Give the standard and canonical form of LPP. 4

(B) Define objective function and constraint of LPP. 4

(C) Solve the following LPP by graphical method : 4

Max $Z = 4x_1 + 3x_2$

s.t. $2x_1 + x_2 \leq 1000$

$x_1 + x_2 \leq 800$

$x_1 \leq 400$ and $x_2 \leq 700$

and $x_1, x_2 \geq 0$.

OR

3. (P) Define basic feasible solution and optimum feasible solution. 4

(Q) State the Simplex algorithm of solving LPP. 4

(R) Solve the following LPP by graphical method : 4

Max $Z = 4x_1 - 2x_2$

s.t. $x_1 - 5x_2 \leq 8$

$3x_1 - 4x_2 \leq 9$

and $x_1, x_2 \geq 0$.

4. (A) Explain column minima method of transportation problem and solve the following problem by column minima method : 6

	D_1	D_2	D_3	D_4	
O_1	6	9	11	3	10
O_2	2	13	6	14	05
O_3	1	8	9	13	09
O_4	12	4	6	8	11
	8	7	15	5	

(B) Define transportation problem and Vogel's approximation method. 6

OR

5. (P) State and prove necessary and sufficient condition for existence of feasible solution to transportation problem. Explain non-degenerate solution to transportation problem. 6

(Q) Explain the North West corner rule and solve the following transportation problem by this method : 6

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Require	200	225	275	250	

6. (A) Explain Hungarian algorithm to solve assignment problem. 6

(B) Define :-

(i) Strategy

(ii) Pure strategy

(iii) Mixed strategy. 6

OR

7. (P) Define assignment problem and give its mathematical formulation. 6

(Q) Determine optimal sequence and total elapsed time and idle time if any for the following sequencing problem : 6

Machine \ Job	J_1	J_2	J_3	J_4	J_5	J_6	J_7	J_8	J_9
M_1	2	5	4	9	6	8	7	5	4
M_2	6	8	7	4	3	9	3	8	11

8. (A) Define ANOVA and explain its assumptions. 4

(B) State the null hypothesis and mathematical model for one way classification. 4

(C) Give ANOVA table for two way classification with m observation per cell. 4

OR

9. (P) Explain a linear model of two way classification with one observation per cell. 4

(Q) State the hypothesis to be tested in two way classification with m observation per cell. 4

(R) Give ANOVA table of two way classification with one observation per cell. 4

10. (A) Define CRD and state its linear model. 4

(B) Obtain the efficiency of RBD relative to CRD. 4

(C) Discuss the advantages and disadvantages of RBD. 4

OR

11. (P) Define :—

(i) Experimental error

(ii) Treatment. 4

(Q) State the principles of design of experimental and explain any one of them. 4

(R) Obtain the least square estimates of various effects in CRD. 4

12. (A) Define :—

(i) Contrast

(ii) Orthogonal Contrast. 4

(B) Give the particular layout of 5×5 LSD with A, B, C, D, E treatments. 4

(C) Explain Yate's method for 2^2 factorial experiment. 4

OR

13. (P) Obtain various sums of squares in LSD. 4

(Q) State advantages and disadvantages of LSD. 4

(R) Give the various treatment combinations in 2^2 and 2^3 factorial experiment in systematic order. 4