1604E228

Candidate's Seat No :_____

B.Sc. Sem.-6 Examination

SE-311

Statistics (B)

April-2025

Time : 2-30 Hours] **[Max. Marks : 70**

1. (A) What is the role of duality in Linear Programming problem? (18)

   (B) Write dual of the following LPP:

$$\begin{aligned} Max\ z = 3x_1 + 2x_2 & \\ \text{subject to } 2x_1 + x_2 &\leq 1 \\ 3x_1 + 4x_2 &\geq 4 \\ \text{and } x_1, x_2 &\geq 0 \end{aligned}$$

OR

   (A) Explain the steps and rules to convert primal problem to its dual problem.

   (B) Solve following primal LPP and find the solution of its dual problem.

$$\begin{aligned} Max\ z = 2x + 5y & \\ \text{s.t. } x + 4y &\leq 24 \\ 3x + y &\leq 21 \\ x + y &\leq 9 \\ \text{and } x, y &\geq 0 \end{aligned}$$

2. (A) Explain the method of processing n jobs through m machines. (18)

   (B) There are five jobs, each of which is to be processed through two machines M_1 and M_2 in the order M_1, M_2, processing hours are as follows:

Machine \ Jobs	1	2	3	4	5
Machine M_1	3	8	5	7	4
Machine M_2	4	10	6	5	8

   Determine the optimum sequence for the five jobs, and minimum elapsed time. Also, find the idle time of machines A and B.

OR

   (A) What do you mean by job sequencing problem? What are the assumptions of job sequencing problem?

   (B) Find an optimal sequence for the following sequencing problem of four jobs and five machines when passing is not allowed. The processing time (in hours) is given below:

3. (A) In context with replacement theory, explain different types of failures. (18)

   (B) Which assumptions are required for replacement decisions? Explain the methodology of solving replacement problem.

(P.T.O)

B.Sc. Semester VI (Statistics STA-311)
Semester Examination

Jobs \ Machine	A	B	C	D	E
1	7	5	2	3	9
2	6	6	4	5	10
3	5	4	5	6	8
4	8	3	3	2	6

OR

(A) A milk plant is considering replacement of a machine whose cost price is Rs. 12,200 and the scrap value is Rs. 200. The running (maintenance and operating) cost in Rs. are found from experience to be as follows:

Year	1	2	3	4	5	6	7	8
Cost	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced?

(B) The cost of a machine is Rs. 6100 and its scrap value is only Rs. 100. The maintenance cost are found to be as follows

Year	1	2	3	4	5	6	7	8
Cost	100	250	400	600	900	1250	1600	2000

When should the machine be replaced?

4. Attempt any **Eight out of Twelve.** (16)

(a) State the assumptions in job sequencing problems.

(b) With reference to sequencing problem, explain total elapsed time.

(c) What do you mean by a degenerate solution?

(d) In context with LPP, define optimal solution.

(e) How can youn solve the sequencing problem with 5 jobs and 6 machines?

(f) Give some real life examples of job sequencing.

(g) State the importance of job sequencing.

(h) How to find the solution of Dual from the final simplex table of Primal problem?

(i) What is the fundamental theorem of duality?

(j) What can you say about the solution of other dual, if the primal problem has unbounded solution?

(k) What can you say about the cost $c's$ and requirement $b's$ of primal and dual problem?

(l) State the usefulness of duality.

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End of Paper.