TKN/KS/16 – 5929

Sixth Semester Bachelor of Science (C.B.S.) Examination

STATISTICS

Compulsory Paper - I

(Operations Research)

Time : Three Hours] [Max. Marks : 50

N. B. : All questions are compulsory and carry equal marks.

1. (A) Explain the rules for drawing network diagram state. Explain and illustrate with diagrams the errors involved in the construction of network diagram.

OR

(E) Discuss PERT analysis. 10

2. (A) Write the dual of the following primal :

$$\text{Min } z = 5x_1 + 2x_2$$

$$\text{St } 3x_1 + 2x_2 = 9$$

$$4x_1 + x_2 = 10 \text{ , } x_1, x_2 \geq 0.$$

Hence state the various steps involved in writing a dual of a primal LPP in standard form. 5

(B) Prove that : The dual of dual is primal. 5

OR

(E) What are direct, indirect and total cost of a project ? How are they related to project completion time ? Explain it with graph. Also show with graph, how the least cost duration is determined. 10

3. (A) Discuss least cost and vogels approximation methods used for finding basic feasible solution to a transportation problem. Which one of the two is likely to give solution close to optimal solution and why ? 10

OR

(E) Define a transportation problem. Explain how maximization transportation problem can be solved. 5

(F) Prove that the basic for a transportation problem is always triangular. 5

4. (a) State the conditions that must be satisfied in a competitive situation, so that it can be called a game :

Define the terms :

(i) Player.

(ii) Strategy.

(iii) Optimum strategy.

(iv) Value of the game.

(v) Payoff matrix.

In a two person zero sum game, player A competes with B. If the payoff matrix.

of A is $\begin{pmatrix} 3 & -1 & k \\ \lambda & 5 & 2 \\ 4 & 1 & 0 \end{pmatrix}$ and that of B is $\begin{pmatrix} a & -4 & e \\ b & c & f \\ 7 & d & g \end{pmatrix}$

Find the values of k and λ. 10

OR

(E) Define an assignment problem. Describe Hungarian method to solve assignment problem. When will there be an alternate optimal solution to an assignment problem ? 10

5. Solve any **ten** of the following questions :—

(A) If the head event and tail event slack for a certain activity is zero, what is the relation between, total, free and independent float ?

(B) Give a situation, where dummy activity is used.

(C) Which events will always have zero slack.

(D) When will it be advisable to solve the dual of an LPP instead of primal ?

(E) Which activity should be crashed during time–cost optimization ?

(F) In an m x n transportation problem, what will be the number of dual variables ?

(G) Derive the number of basic variables in an (m x n) transportation problem.

(H) In a basic feasible solution of m x n transporation problem, how many cells remain unoccupied ?

(I) Does a set of cells x={(2, 3), (4, 3), (4, 6), (3, 6), (2, 6)} Constitute a loop ? Give reason.

(J) What is maximum strategy ?

(K) Express assignment problem as linear programming problem.

(L) If an assignment problem involves 6 resources and 6 activities, then state the number of columns and rows in the corresponding simplex table.

10×1=10