NRT/KS/19/2183

Bachelor of Science (B.Sc.) Semester—VI Examination

OPERATIONS RESEARCH

Optional Paper—1

(Statistics)

Time : Three Hours]   [Maximum Marks : 50

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

1. (A) What is critical path ? Explain different types of float associated with activities in network. What will be float for critical activity ?

   (B) Explain looping and dangling in the Network analysis with the help of network diagram. How these can be avoided ?   5+5

   OR

   (E) Discuss PERT analysis.   10

2. (A) Define cost-slope of an activity. How is cost slope used in crashing the project ? Which activity should be preferentially crashed ? Which activity when crashed will not reduce project duration ?   10

   OR

   (E) If for certain feasible solutions to the primal and dual their respective objective functions attain same value, then prove that the feasible solutions are optimum solutions.

   (F) For a primal-dual pair, if there exists an optimum solution to either, then there exists optimum solution to other.   5+5

3. (A) Prove that a transportation problem has a triangular basis.

   (B) Describe the Vogel's approximation method used for finding initial basic feasible solution to a transportation problem.   5+5

   OR

   (E) Prove that necessary and sufficient condition for transportation problem to attain a feasible solution is that it should be balanced.

   (F) Discuss North-West Corner Rule for determining the initial basic feasible solution to a transportation problem. When will the solution be degenerate ?   5+5

4. (A) Discuss Hungarian method for obtaining an optimal solution of an assignment problem.   10

   OR

   (E) Define competitive game. Give two real life situations where game-theory can be applied. Define a two person zero sum game.

   (F) Define the terms :

      (i) Player

      (ii) Strategy

      (iii) Optimum strategy

      (iv) Mixed-strategy

      (v) Pure strategy.   5+5

5.   Solve any **TEN** of the following questions :

(A)   Distinguish between float and slack.

(B)   State two uses of dummy activity.

(C)   Which events will always have zero slack ?

(D)   Stating whether the following statements are true or false, rewrite the correct statements :

   (i)   Dual of a dual LPP is again a dual problem.

   (ii)   If a primal has an unbounded objective function then dual has no feasible solution.

(E)   If a LPP consists of 3 constraints with 5 variables, which one will be easy to solve, the given LPP or its dual? Give reason for the answer.

(F)   Which activity or activities should be crashed, as and when, there are multiple critical paths, to reduce the project duration ?

(G)   Define a loop in a transportation table.

(H)   What could be the number of positive allocations in a transportation problem for the solution to be basic feasible; given that the problem has m-sources and n-destinations.

(I)   In a transportation problem there are 7-sources and 8-destinations. State the number of allocations in a non-degenerate basic feasible solution for this problem.

(J)   What is 'minimax' strategy ?

(K)   In a two person (A and B) zero sum game, is it necessary to construct payoff matrix for both players ? Why ?

(L)   When will an assignment problem have an alternate optimal solution ? $1 \times 10 = 10$