Bachelor of Science B.Sc. Semester–VI (CBS) Examination

OPERATIONS RESEARCH

Paper–I (Statistics)

Time : Three Hours] [Maximum Marks : 50

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

1. (a) Explain total float, free float and independent float in a network. Define critical path in terms of float.

   (b) State the rules of network construction. Also define Looping and Dangling in a network. 5+5

OR

   (e) "What are the three time estimates associated with an activity in PERT analysis" ? Explain the use of these time estimates to compute the probability of completing the project in specified time. 10

2. (a) State an LPP in standard form and write its dual. Also prove that "The dual of a dual is a primal problem.

   (b) Define direct and indirect cost of a project. Explain how these very with time. 5+5

OR

   (e) Discuss time-cost trade-off analysis. 10

3. (a) Describe a transportation problem and write it as an LPP model. What is meant by an unbalanced transportation problem ? How is it transformed into balanced transportation problem ? Prove that a balanced transportation always possesses a feasible solution. 10

OR

   (e) Describe least cost method for finding initial basic feasible solution and MODI method for getting the optimal solution to a transportation problem. 10

4. (a) Explain an assignment problem. Show that it is a special case of transportation problem. Prove that the optimum assignment remains unchanged if a constant is added to or subtracted from all the element of a row or column of the assignment cost matrix. 10

OR

   (e) Define a two-person zero-sum game. Explain the following terms in the context of a two-person zero-sum game :

   (i) Player (ii) Strategy (iii) Payoff matrix (iv) Pure strategy (v) Mixed strategy (vi) Saddle point (vii) Value of the game.

   State the rules to determine the saddle point. 10

5. (a) Define

(i) Earliest start time

(ii) Latest finish time.

(b) What is a merge event and a burst event in a network ?

(c) Fill in the blank :

CPM is _____ approach and PERT is a _____ approach.

(d) Give the statement of Complementary Slackness theorem.

(e) Write the dual of the following primal :

Min. $Z = x_1 - 4x_2 + x_3$

s.t. $3x_1 - 4x_2 + 2x_3 \leq 6$

$4x_1 - 3x_2 + x_1 \leq 9$

$-9x_1 + 5x_2 + 4x_3 = 9$

$x_1, x_2, x_3 \geq 0$

(f) Define cost slope of an activity.

(g) State the condition for an alternate optimal solution to a transportation problem.

(h) Define "Non-degenrate basic feasible solution" of transportation problem.

(i) Fill in the blank :

The North-West corner rule is used to obtain _____ solution whereas stepping stone method is used to obtain _____ solution in case of transportation problem.

(j) In game theory, what is the graphical method used for ?

(k) If an assignment problem is profit maximization problem, then how can it be converted into a minimization problem ?

(l) In a two person zero sum game. Why is it not necessary to construct payoff matrix for player B ? 1×10=10