**Q1: Transportation problem**

Given parameter c(1,1) = 60, c(1,2) = 65, c(2,1) = 55, c(2,2) = 45

Solving this transportation problem using MIP in GAMS, the results are shown as below,

x(1,1) = 50, x(1,2) = 50, x(2,1) = 100, x(2,2) = 100, z = 16250.

That is, 50k passengers to airport 1 with 50 passengers to airport 2 in city 1 while 100k passengers to airport 1 with 100 passengers to airport 2 in city 2, and the total travel time is 16250k.

**Q2: Shortest path problem**

Given parameter w(1,2) = 5, w(1,3) = 2, w(3,2) = 2, w(2,4) = 1, w(3,4) = 4

Solving this shortest path problem using MIP in GAMS, the results are shown as below,

x(1,3) = 1, x(3,2) = 1, x(2,4) = 1, x(i,j)=0 (others), z = 5.

That is, the shortest path for this problem should be 1->3->2->4, and the total cost is 5.

**Q3: Dynamic system optimal problem**

In this problem, minimizing total travel time of all agents is set as the objective function. Based on the given demand information, space-time path of each agent is summarized as below, and the total travel time is 63.

Table 1 space-time path of each agent

|  |  |
| --- | --- |
| agent id | path |
| 1 | 1-2-6-4 |
| 2 | 1-7-3-4 |
| 3 | 1-2-6-4 |
| 4 | 1-7-7-7-3-4 |
| 5 | 1-2-5-8-3-4 |
| 6 | 1-7-3-4 |
| 7 | 1-2-5-8-3-4 |
| 8 | 1-2-6-4 |
| 9 | 1-2-6-4 |
| 10 | 1-2-5-8-3-4 |