

QQQ – Decision 2 – Chapter 5 – Dynamic Programming (Version 2)

Total Marks: 24

(24 = Platinum, 22 = Gold, 19 = Silver, 16 = Bronze)

1. A factory can process up to five units of carrots each month.

Each unit can be sold fresh or frozen or canned.

The profits, in £100s, for the number of units sold, are shown in the table.

The total monthly profit is to be maximised.

Number of units	0	1	2	3	4	5
Fresh	0	45	85	120	150	175
Frozen	0	45	70	100	120	130
Canned	0	35	75	125	155	195

Use dynamic programming to determine how many of the five units should be sold fresh, frozen and canned in order to maximise the monthly profit. State the maximum monthly profit. **(12)**

(Total 12 marks)

2.

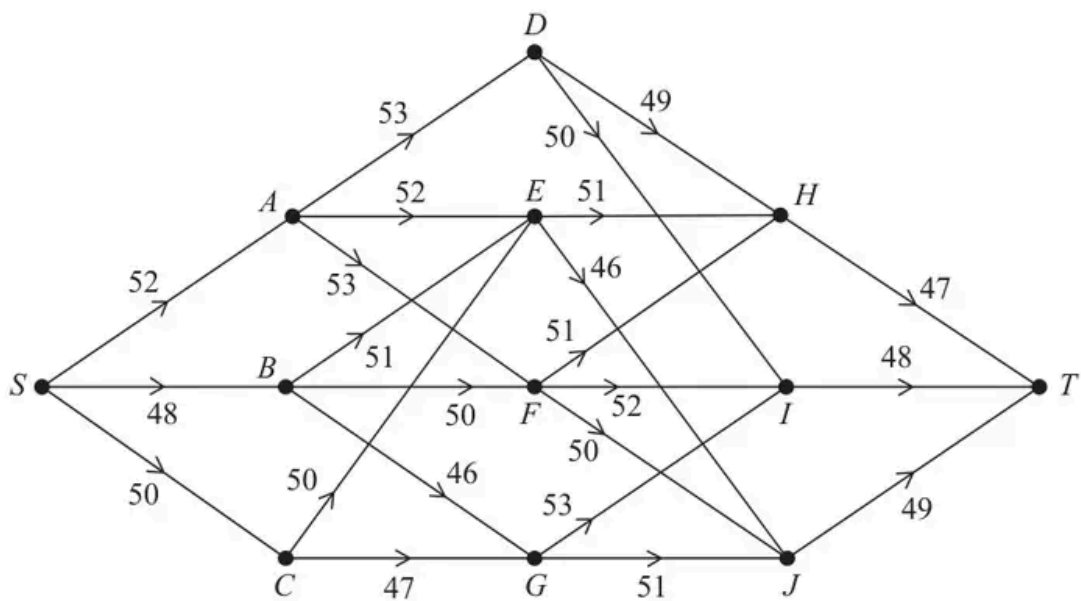


Figure 3

The staged, directed network in Figure 3 represents a series of roads connecting 12 towns, $S, A, B, C, D, E, F, G, H, I, J$ and T . The number on each arc shows the distance between these towns, in miles.

Bradley is planning a four-day cycle ride from S to T .

He plans to leave his home at S . On the first night he will stay at A, B or C , on the second night he will stay at D, E, F or G , on the third night he will stay at H, I or J , and he will arrive at his friend's house at T on the fourth day.

Bradley decides that the maximum distance he will cycle on any one day should be as small as possible.

- (a) Write down the type of dynamic programming problem that Bradley needs to solve. (1)

(b) Use dynamic programming to complete the table below. (9)

Stage	State	Action	Destination	Value

- (c) Hence write down the possible routes that Bradley could take. (2)

(Total 12 marks)