Ch22

Artificial Intelligence (AI)

CHAPTER ASSIGNMENT · 11 MARKS

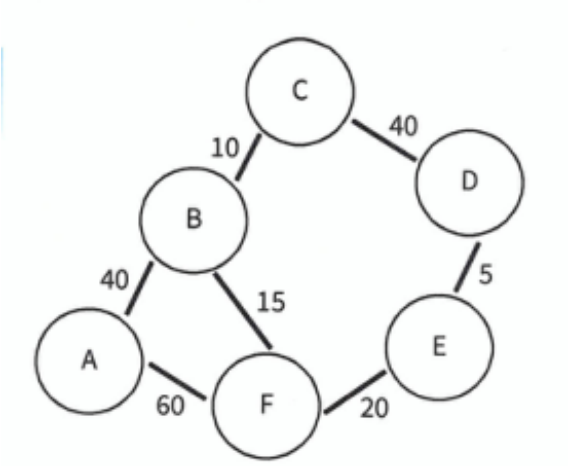
Name _____ Class _____ No. _____ Date _____

Answer every question in the space given. Show your working. You may use the chapter page to help you.

Questions from *Computer Science for Cambridge International AS & A Level Coursebook*, 2nd edition, Sylvia Langfield and Dave Duddell (Cambridge University Press), for classroom use.

Tasks and questions from the chapter

Q22.01 Can you think of two alternatives for what the graph in Figure 22.01 might represent? For each of these, state what the values shown as edge labels would represent.



DP **Discussion Point:** Do you know what a heuristic function is?

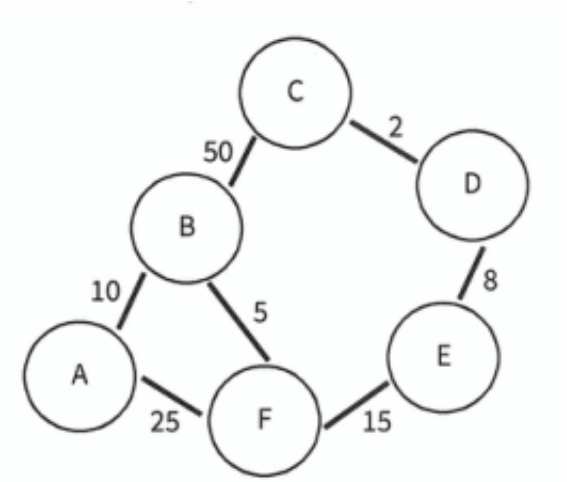
DP **Discussion Point:** The techniques discussed here can be used for path-finding when there are obstacles. Can you find some information about how this is approached?

EQ22.01 **Extension Question 22.01:** An early successful application of an artificial neural network was NETtalk. This was able to take a text as input and output a synthesised sound reading of the text. The network had 7 times 29 input nodes and 26 output nodes. Can you investigate why that number of input nodes was chosen and what was the function of some of the 80 nodes in the hidden layer?

RP **Reflection Point:** Could you create a hierarchical chart to show how the various approaches discussed in this chapter are related to each other?

Exam-style questions

1. The diagram below shows a graph representing the cost of journeys between railway stations identified by A, B, C, D, E and F.



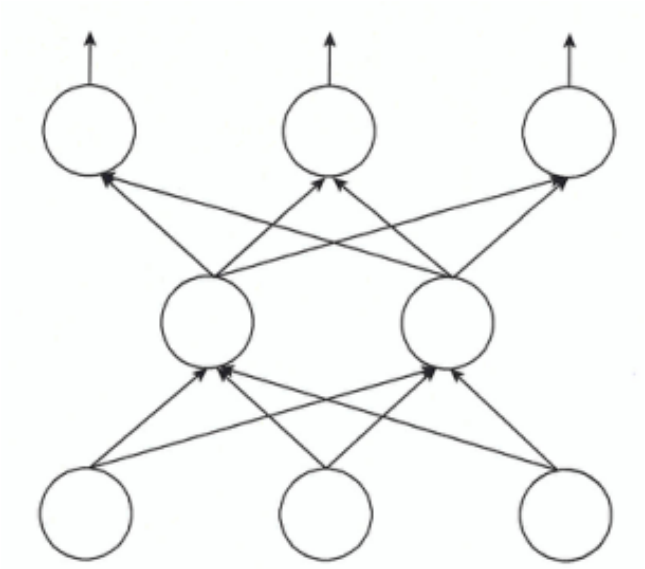
Dijkstra's algorithm is to be used to find the total cost for journeys from station A to each of the other stations. A record structure is to be used to store for each station the cost for the travel so far and the list of stations so far visited in the order visited. Complete the table below to record the progress of the algorithm by identifying which nodes are in the ShortestPath set and what would be stored in the record at each step of the algorithm.

The first two rows of the table have been completed for you. [7]

Content of the ShortestPath set	Content of the record					
{}	A	B	C	D	E	F
	0	∞	∞	∞	∞	∞
{A}	A	B	C	D	E	F
	0	10	∞	∞	∞	25
	A	A-B				A-F
	A	B	C	D	E	F
	A	B	C	D	E	F
	A	B	C	D	E	F
	A	B	C	D	E	F
	A	B	C	D	E	F

2. The diagram below represents an artificial neural network.

(a) Give as full a description as you can of what the parts of the diagram represent. If you wish you can label the diagram then use the labels in your answer. [5]



(b) Identify the steps involved when a backward propagation of errors algorithm is used. [4]

3

(a) Give a brief explanation of each of the following terms:

- Machine learning
- Artificial neural network
- Deep learning [9]

(b) Explain which approach uses back propagation of errors. [2]

End of assignment · Check your answers against the chapter at gurujazzy.com/subjects/computer-science/as-a-level/artificial-intelligence/