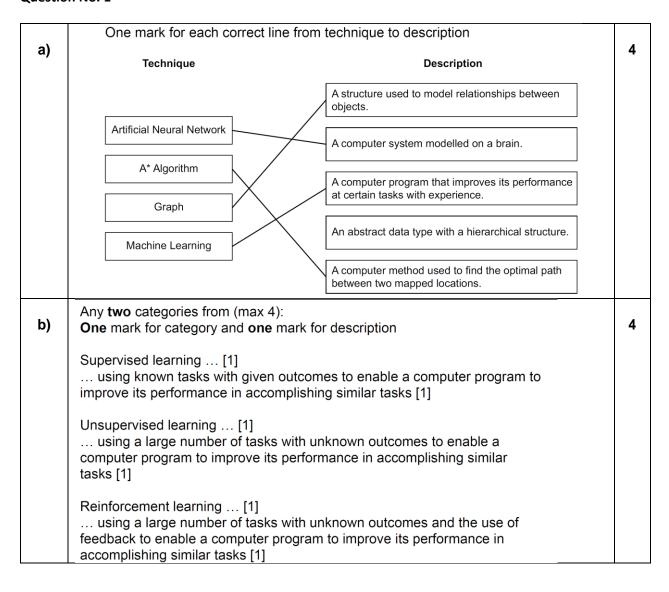
Question No. 1



Question No. 2

| a) | Working (Max 3) May be seen on diagram Initialisation: setting Base to 0 and the rest of the towns to ∞ Evidence to show values at nodes being updated Evidence to show 'visited node(s)' May be seen in working section of paper Evidence to show calculation of at least one route Evidence to show more than one route has been calculated for at least one town Correct Answer (Max 2) One mark for four correct values One mark for all values correct | | | | | | 5 | |
|----|--|--------|--------|--------|--------|--------|---|--|
| | Town 1 | Town 2 | Town 3 | Town 4 | Town 5 | Town 6 | | |
| b) | One mark for each correct marking point (Max 3) Artificial Neural Networks can be represented using graphs Graphs provide structures for relationships // graphs provide relationships between nodes Al problems can be defined/solved as finding a path in a graph Graphs may be analysed/ingested by a range of algorithms e.g. A* / Dijksta's algorithm used in machine learning. Example of method e.g. Back propagation of errors / regression methods | | | | | 3 | | |

Question No. 3

| a) i) | One mark for correct statement (Max 1) Enables deep learning to take place Where the problem you are trying to solve has a higher level of complexity it requires more layers to solve To enable the neural network to learn and make decisions on its own To improve the accuracy of the result. | 5 |
|--------|---|---|
| a) ii) | One mark for each correct marking point (Max 4) Artificial neural networks are intended to replicate the way human brains work Weights / values are assigned for each connection between nodes The data are input at the input layer and are passed into the system They are analysed at each subsequent (hidden) layer where characteristics are extracted / outputs are calculated this process of training / learning is repeated many times to achieve optimum outputs // reinforcement learning takes place Decisions can be made without being specifically programmed The deep learning net will have created complex feature detectors The output layer provides the results Back propagation (of errors) will be used to correct any errors that have been made. | 3 |

One mark for each correct calculation as follows (Max 4)

b)

- Node B (from Home) (Line 3 in table)
- Node C (from Home) (Line 4 in table)
- Node B and Node E (from A) (Lines 5 and 6 in table)
- Node F and Node School (from E) (Lines 7 and 8 in table)
- Node School (from F) (Line 9 in table)

One mark for correct path (Max 1):

Home
 A
 E
 F
 School

| | Node | Cost from Home Node (g) | Heuristic (h) | Total (f = g + h) | |
|---|--------|----------------------------|------------------|----------------------|--|
| 1 | Home | 0 | 14 | 14 | |
| 2 | Α | 1 | 10 | 11 | |
| 3 | В | 5 | 7 | 12 | |
| 4 | С | 4 | 9 | 13 | |
| 5 | В | 1 + 3 = 4 | 7 | 11 | |
| 6 | Е | 1 + 6 = 7 | 3 | 10 | |
| 7 | F | 7 + 1 = 8 | 3 | 11 | |
| 8 | School | 7 + 5 = 12 | 0 | 12 | |
| 9 | School | 8 + 3 = 11 | 0 | 11 | |
| | | | | | |
| | | | | | |
| | | | | | |

| Final Path | Home A E F School |
|------------|---------------------------|
|------------|---------------------------|