Question 1. [4 Marks: CLO (a)].

Comment the following statement by "True" or "False" with respect to your understanding to the terms. **(5 Points)**

No.	Text	True/False
1.	Dictionary definitions of **intelligence** talk about "the capacity to acquire and apply knowledge" or "the faculty of thought and reason" or "the ability to comprehend and profit from experience." These are all reasonable answers, but if we want something quantifiable we would use something like "the ability to apply knowledge in order to perform better in an environment."	T
2.	We define **artificial intelligence** as the study and construction of agent programs that perform well in a given environment, for a given agent architecture.	T
3.	We define an **agent** as an entity that takes action in response to percepts from an environment.	T
4.	We define **rationality** as the property of a system which does the "right thing" given what it knows.	T
5.	We define **logical reasoning** as the a process of deriving new sentences from old, such that the new sentences are necessarily true if the old ones are true.	F
6.	Although bar code scanning is in a sense computer vision, these are not AI systems. The problem of reading a bar code is an extremely limited and artificial form of visual interpretation, and it has been carefully designed to be as simple as possible, given the hardware.	T
7.	Slightly at most. The spelling correction feature here is done by string comparison to a fixed dictionary. The grammar correction is more sophisticated as it need to use a set of rather complex rules reflecting the structure of natural language, but still this is a very limited and fixed task.	T
8.	The spelling correctors in search engines would be considered much more nearly instances of AI than the Word spelling corrector are, first, because the task is much more dynamic – search engine spelling correctors deal very effectively with proper names, which are detected dynamically from user queries – and, second, because of the technique used – data mining from user queries vs. string matching.	T
9.	"Surely computers cannot be intelligent—they can do only what their programmers tell them."	T
10.	Examine the AI literature to discover the following tasks can currently be solved by computers: ✓ Playing a decent game of table tennis (Ping-Pong). ✓ Driving in Victorville, California. ✓ Buying a week's worth of groceries on the Web. ✓ Playing a decent game of bridge at a competitive level. ✓ Discovering and proving new mathematical theorems. ✓ Translating spoken English into spoken Swedish in real time. ✓ Performing a complex surgical operation.	F

4.0

Question 2. (7Marks)

2.1 An **agent** is anything that can be viewed as perceiving its **environment** through **sensors** and acting upon that environment through **actuators**. Give the possible sensors for the following agents: **(3 Points)**

Agent	Sensors	Actuators
A human agent:	eyes, ears, nose, tongue skin	arms, Legs
A robotic agent:	camera, sensors, microphone	wheels,
A software agent:	Keyboard, mouse, microphone	screen, speakers

2.2 We use the term **percept** to refer to the agent's perceptual inputs at any given instant. An agent's **percept sequence** is the complete history of everything the agent has ever perceived.

In general, *an agent's choice of action at any given instant can depend on the entire percept sequence observed to date, but not on anything it hasn't perceived.* By specifying the agent's choice of action for every possible percept sequence, we have said more or less everything about agent.

Question: Describe in brief two different techniques to implemt the agent function.

Technique 01	Simple reflex agent :- it is based on condition-action ~~attitude~~ attitude
Technique 02	Reflex agent

Student's Name:.....Student's ID.....

Question 4. (8 Marks)

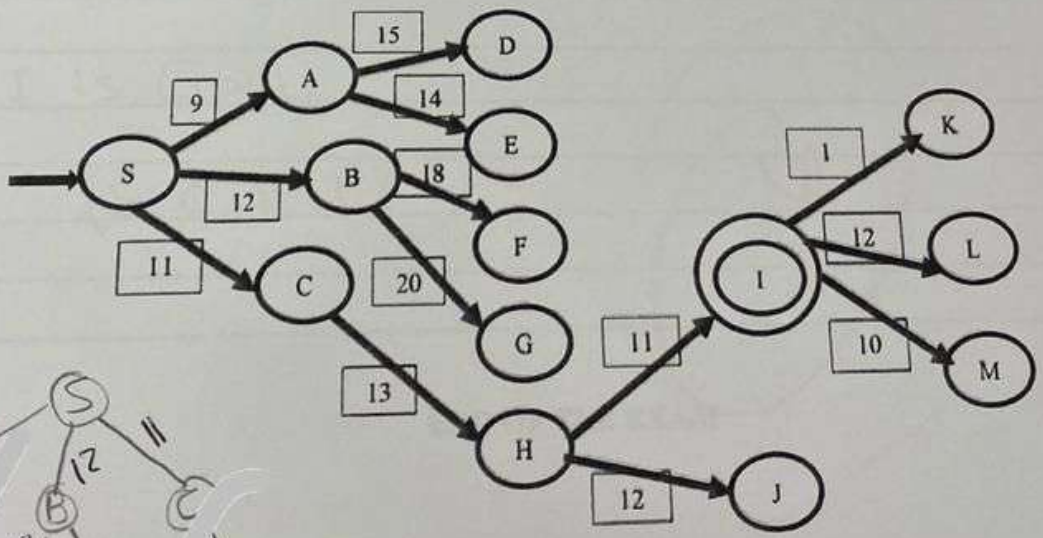
In BFS and DFS, when we are at a node, we can consider any of the adjacent as next node. So both BFS and DFS blindly explore paths without considering any cost function. The idea of **Best First Search is to use an evaluation function to decide which adjacent is most promising and then explore. Best First Search falls under the category of Heuristic Search or Informed Search.**

We use a priority queue to store costs of nodes. So the implementation is a variation of BFS, we just need to change Queue to PriorityQueue.

The pseucode of the BFS is as follows:

```
Best-First-Search(Grah g, Node start)
  1) Create an empty PriorityQueue
     PriorityQueue pq;
  2) Insert "start" in pq.
     pq.insert(start)
  3) Until PriorityQueue is empty
       u = PriorityQueue.DeleteMin
       If u is the goal
          Exit
       Else
          Foreach neighbor v of u
            If v "Unvisited"
               Mark v "Visited"
               pq.insert(v)
          Mark v "Examined"
End procedure
```

Considering the following ghraph, trace the above Best-First-Search algorithm:



Answer: Complete the tracing as it starts below:

We start from source "S" and search for
goal "I" using given costs and Best First search.
pq initially contains S
We remove s from and process unvisited
neighbors of S to pq.
pq now contains {A, C, B} (C is put before B because C has lesser cost)

we check if A is the goal, it is not the goal.
we remove A and process unvisited neighbors of A to pq.
Pq now contains {C, B, E, D}.
C is not the goal, so we remove it and process it's neighbors.
Pq contains {B, H, E, D} (H is put before E, D → has lesser cost.
B is not the goal, we remove it and process neighbors.
Pq contains {H, E, D, G}
H is not the goal, we remove it and process it's neighbors
Pq contains {I, J, E, D, G}
I is the goal, goal is found
so we terminate.

9.0

END OF THE EXAM