Question No: 01

This is a subjective question, hence you have to write your answer in the Text-Field given below.

Answer to the below question for the following scenario, with relevant justification each in no more than 30 words. [2+2+3=7 Marks]

Note: If you are new to cloud computing read following example to understand the use case in simple terms. Else you may skip this "Note" section. Take an example of google colab which we use in our courses' lab for programming & Demo. A student trying to open a colab instance triggers a JOB to the cloud management system. Here JOB is analogous to a request for machine resources to work online from the public service provider. Assigning a job to a machine is allotting machine resources to the JOB for specific duration. For the users of the platform, the service providers allot network, compute, storage resources on-demand from remote machines hosted in a serviced data centers by virtualization techniques. Thereby two students working in colab might be using the same physical machine but under the notion of different virtual machines for their remote experiments.

Question:

"Incoming job requests from clients to a public cloud platform each with a specific length (ie., duration of resource requirement) are subject to deadlines ie., (Job1, DurationT1),

Question No: 01

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Question:

"Incoming job requests from clients to a public cloud platform each with a specific length (ie., duration of resource requirement) are subject to deadlines ie., (Job1, DurationT1), (Job2, DurationT2), (Job3, DurationT3) etc.,. To allot the open computing resources for a short term immediate requirement, public cloud providers rent computing resources to paying clients. The public cloud providers would always like to maximize their profit from renting their machines. If a resources is allocated for a long-term there is a possibility that it might often stay idle when they might have been subleased for a short period. Design an artificial intelligent agent to assign the job on to an available host machine or return failure if no feasible assignment possible."

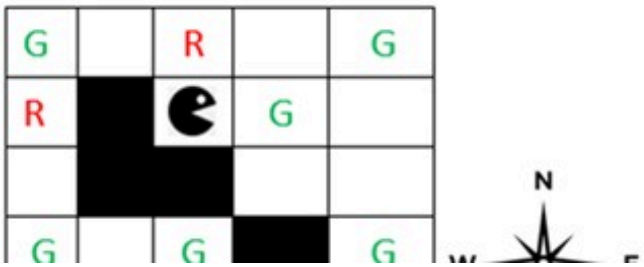
a. Provide the complete problem formulation with PSA design.
b. Provide the PEAS description.
c. All the dimensions of the Task Environment

Question No: 02

This is a subjective question, hence you have to write your answer in the Text-Field given below.

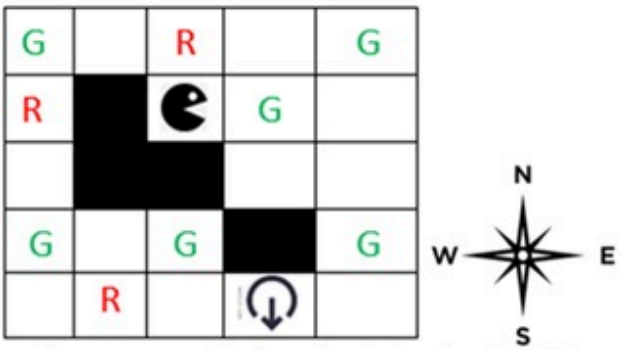
[3+2+4 = 9 Marks]

In this single player game, the Pacman Agent aims to efficiently reach the "Exit" in the shortest way possible, after eating atleast one **R**ed food pellet and one **G**reen food pellet (though Pacman may eat more than one of each food pellets in its path). Pacman has four actions: moveNorth, moveSouth, moveWest, or moveEast and it does not have a "stay" action. Each action incurs a cost of +2 for the agent. In addition to this, if an agent eats a red pellet and green pellet it incurs a cost of +5 and +3 respectively. In below fixed board configuration of dimension N*M, there are 3 red pellets and 6 green pellets.



Question No: 02

pellet and green pellet it incurs a cost of +5 and +3 respectively. In below fixed board configuration of dimension N*M, there are 3 red pellets and 6 green pellets.



a. Depict the search tree for up to exactly three levels ie., level 3. (Given initial state can be assumed to be on level-0.) with calculated path cost shown in the diagram neatly
b. Compute the heuristic value for each state and check the admissibility and consistency for any three generated states. Heuristics is given by,

   H(n) = 2(Manhattan distance (PacmanAgent, Exit))*
c. Implement the A* algorithm only for the first 4 closed list updates. Show the status of OPEN and CLOSE list at each level.

Question No: 03

This is a subjective question, hence you have to write your answer in the Text-Field given below.

[4+3=7 Marks]

Two Robots A and B competes to leave the maze through either of exits: E1 and E2, as shown in the diagram. At each time step, each Robot move to an adjacent free square. Robots are not allowed to enter squares that other robots are moving into. The same exit cannot be used by both robots at once, but either robot may use either exit. A poisonous gas is left behind when a robot moves. No robot may enter the poisonous square for the duration of the gas's 1-time-step presence (ie., If the square is left free for one game round, the poison evaporates and is no longer dangerous). The poisonous squares are represented as ×'s in the diagram. For utility calculation consider the below assumptions.

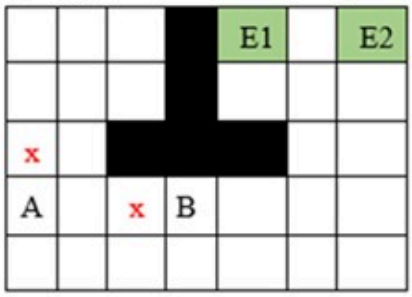
H(n) = (Max player's ability to win in the board position) – (Min player's ability to win in the board position)

Note: *Player "Z's" ability to win is given by below:*

Utility = Minimum (manhanttanDistance(Player "Z", Exit E1), manhanttanDistance(Player "Z", Exit E2)) + Penalty

Question No: 03

Note: *Player "Z's" ability to win is given by below:*
Utility = Minimum (manhanttanDistance(Player "Z", Exit E1), manhanttanDistance(Player "Z", Exit E2)) + Penalty
Penalty = Number of unsafe cells (blockage+ poisonous squares) with 4 degree of freedom(Up, Down, Right, Left) in the immediate neighborhood of the Player "Z's" position.



a. If Robot 'A' starts the play, construct game tree with utility up to level 3 or one round per player and one more round by the MAX player.
b. Implement a MIN-MAX algorithm for the game tree constructed under part a.

Question No: 04

This is a subjective question, hence you have to write your answer in the Text-Field given below.

[1.5+1+3+1.5=7 Marks]

You are asked to design the given problem using genetic algorithm. Explain your design approach in terms of following: Vague answered will be penalized. Calculator can be utilized.

"Find the value of x where $x^2 - (1/x^2)$ *will be maximum in the range of [0, 16]"*

a. Design the Problem Solving Agent formulation & fitness function
b. Describe the Chromose/String representation of a state constituting a parent
c. Detail the approach toward the selection, crossover and mutation steps for this problem. Show this with only one iteration of numerical example and the selection step alone for second iteration.
d. Explain the significance of "mutation" in the genetic algorithm with given example.