

**Graded Assignment 2 for M.Sc Third Semester and Graded Assignment 1 for
Pre Ph.D**

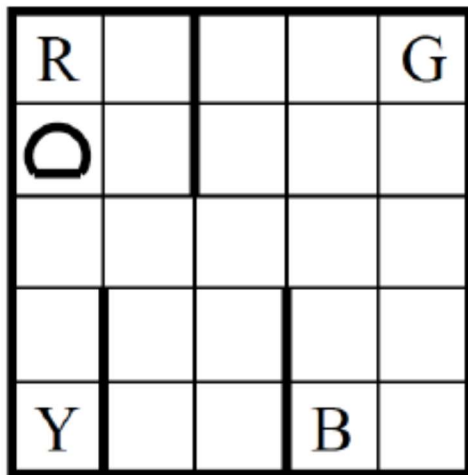
Artificial Intelligence

Monsoon Semester 2020

Max Marks: 20

Note: Upload both the code and the screen shot of the output.

Question: Write Q Learning code for solving famous taxi problem



- **State variables:** taxiLocation {1, ..., 25}, passengerLocation {1, ..., 5} (i.e. waiting at pickup/drop-off {R,G,B,Y} or in the taxi), drop-offLocation {1, ..., 4} (i.e. {R,G,B,Y}).
 - **Initialisation of a trail:** Taxi is uniformly randomly in any of the 25 grid squares, passengerLocation is uniformly randomly in one of the 5 passenger states, dropoffLocation is uniformly randomly one of the 4 drop-off locations
 - **Termination of a trial:** Passenger was successfully droppedoff or after a time constraint (passenger just wants to get out off the taxi and does not care where)
 - **Actions:** 1: go north, 2: go south, 3: go west, 4: go east, 5: pick up passenger, 6: drop off passenger
 - **Reward** is 0, except in the following cases: -1 for an unsuccessful movement (e.g. if blocked by a wall), 1 for a successful pick-up, 10/(number of steps since pick-up) for a successful drop-off, -1 for an attempted drop-off with no passenger or at the wrong location, -1 for an attempted pick-up at the wrong location (or if the passenger is already in the taxi).
1. Use graphical representations (e.g. averaged reward over learning time) to show the performance of your algorithm for random starting and random goal positions.
 2. Represent your solution using an example (Fix e.g. initial passenger position at "Y", goal at "B", and plot the value of the spatial states and the best action for each state).