Q1 a) Give complete Arduino code for the following   **[Marks 5]**

1. Connect 10 LEDs and a Serial Monitor to an Arduino
2. Read an input number from the Serial monitor.
3. If it is less than 32, convert it to Binary. If the number is Odd use only Odd numbered LEDs and if it is even use only even numbered LEDs. Display the Binary on the corresponding 5 LEDs in ON-OFF pattern.
4. Print the value as binary on the Serial monitor.
5. If greater than equal to 32. Print an error message on Serial monitor.

Q1 b) Modify the given Arduino code of a stepper motor to   **[Marks 5]**

1. Read an input number from the Serial monitor.
2. If the number is Odd the motor will rotate in clockwise direction and if it is even anticlockwise direction
3. It will delay for the duration of the magnitude of the number entered
4. Print the cumulative steps taken clockwise and anticlockwise on the Serial monitor.

```
#include <Stepper.h>

const int stepsPerRevolution = 200;

Stepper myStepper(stepsPerRevolution, 8, 9, 10, 11);

void setup() {   myStepper.setSpeed(60);

  Serial.begin(9600);}

void loop() {  Serial.println("clockwise");

 myStepper.step(stepsPerRevolution);

 delay(500);

 Serial.println("counterclockwise");

 myStepper.step(-stepsPerRevolution);

 delay(500);}
```

Q2 We are making software for a traffic light controller for a three road junction. Give Python code for the following functions (use the sample code snippets for multithreading given below)   **[Marks 10]**

  a) How many traffic lights are needed.
  b) Assuming the answer for part a is N. Give code for a function which will create N threads. Each thread will call a function *int getNumVehicles(int i)* which will return the number of vehicles on a road i. The main thread will wait for all the threads to complete. It will create a List of the int vaues corresponding to the number of vehicles on road i.
  c) Give code for a function *trafficLight* which will take as arguments an int and a List of integers (corresponding to N and the return value of getNumVehicles). The set the value in a dictionary *dictTL*. dicTL has keys " 0R, 0Y, 0G, 1R …" . where 0R- Traffic light for road 0 and light Red. Values are 1 or 0 corresponding to ON/OFF light. The light will be Yellow for 10 seconds, Green for n= number of vehicles seconds, Red when any other road has Green/Yellow light ON. Assume that this is done in the order 0, 1, 2…N, 0…
  d) Give a Timing diagram in robust notation for part c)
  e) Give State diagram for part b and c.

```
import threading

def print_cube():
    print("Cube")


def print_square():
    print("Square")


if __name__ =="__main__":
    # creating thread
    t1 = threading.Thread(target=print_square)
    t2 = threading.Thread(target=print_cube)

    # starting thread 1
    t1.start()
    # starting thread 2
    t2.start()

    # wait until thread 1 is completely executed
    t1.join()
    # wait until thread 2 is completely executed
    t2.join()

    # both threads completely executed
    print("Done!")
```