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sybcs. Roll No. : Batch :

: No. : Performed Date : / /20

eriment : stepper motor.

REMARKS

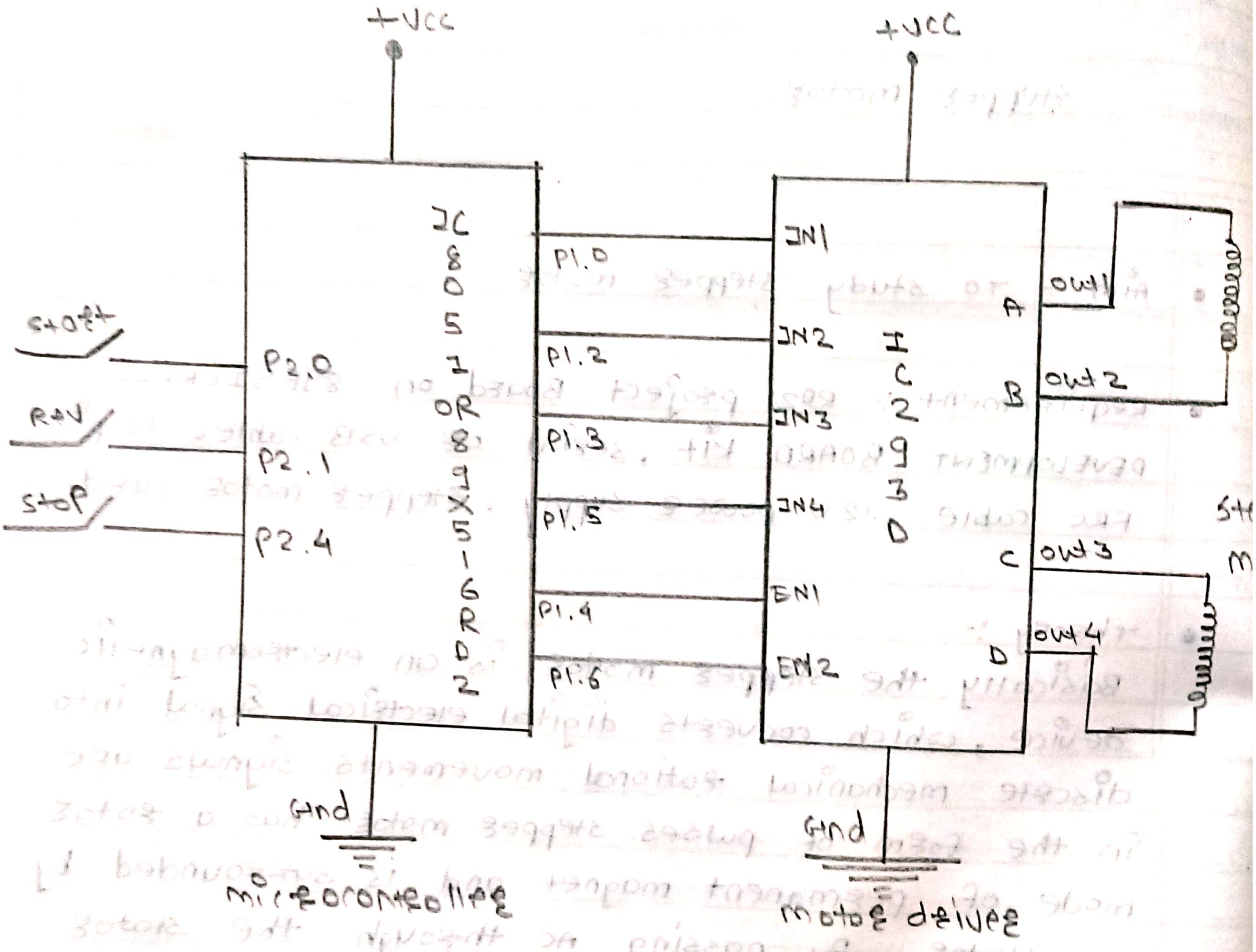
- Aim :- To study stepper motor.

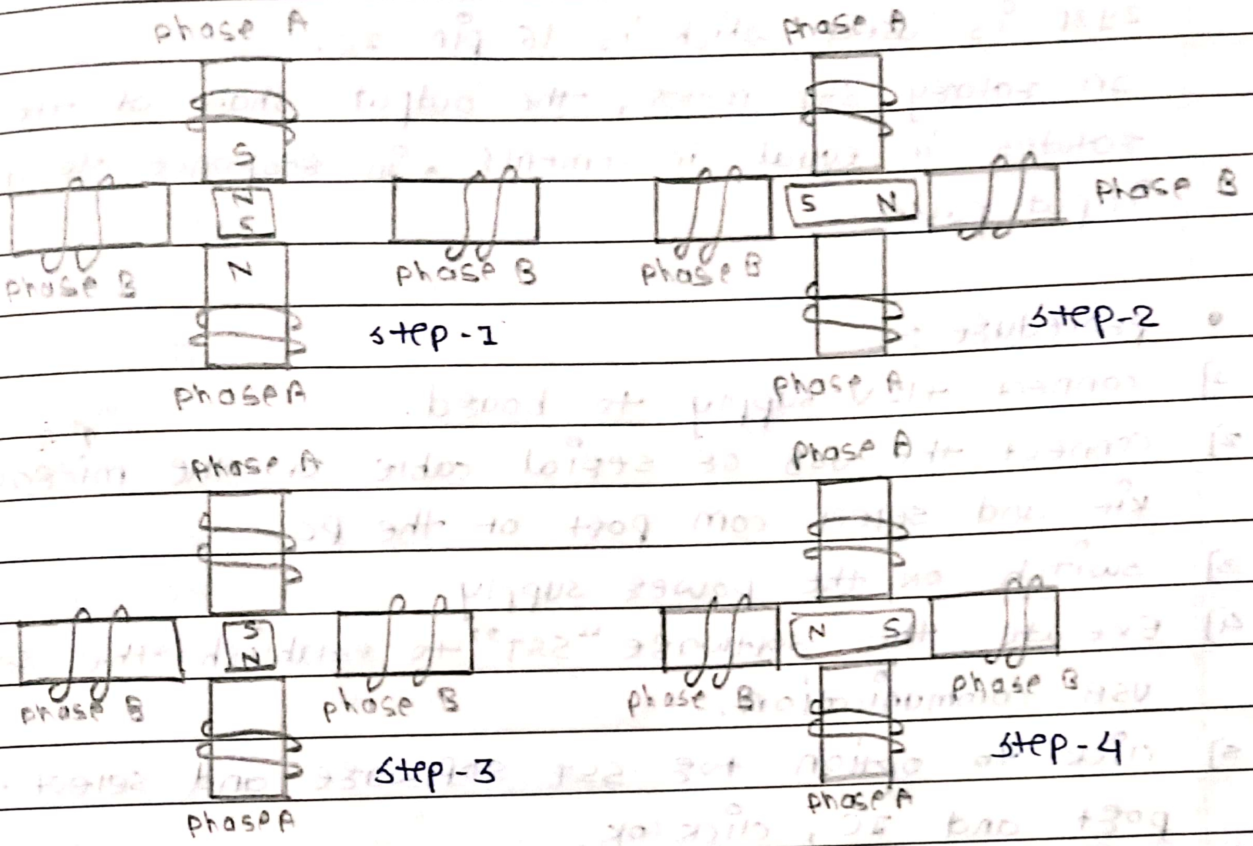
- Requirement :- RD2 project Board on 89E516RD2 DEVELOPMENT BOARD kit, serial or USB cable, 10 pin FRC cable, 12V power supply, stepper motor card.

- Theory :-

Basically the stepper motor is an electromagnetic device, which converts digital electrical signal into discrete mechanical rotational movements. signals are in the form of pulses. stepper motor has a rotor mode of permanent magnet and is surrounded by a stator. By passing AC through the stator the stator get magnetized. It makes the rotor to be displaced so that it goes to an equilibrium position. thus by changing magnetic field in stator the rotor can be made to rotate but in discrete number of steps.

Block Diagram :-





If a stepper motor completes one revolution in n steps than step angle = 360°/n.

Step No	A	B	C	D	Direction	
					clockwise	Anti clockwise
1	0	0	1	1	↓	↑
2	0	1	1	0		
3	1	1	0	0		
4	1	0	0	1		

In this experiment movement of stepper motor is controlled by using microcontroller 8052. To interface

microcontroller 8051 with stepper motor, motor driver IC 293D is used. which is 16 pin IC.
In rotary step motor, the output shaft of the motor rotates in equal increments, in responce to a train of input pulses.

- procedure :-

1] connect +12V supply to board.
2] connect the USB or serial cable of the microcontroller kit and select com port of the PC.
3] switch ON the power supply.
4] Execute the software "SST" to establish the serial or USB communication.
5] click to option for SST software and select the com port and IC, click ok.
6] Execute the software "SST" to establish the serial or USB communication.
7] Download the file (.hex) from the PC to kit.
8] Now if downloading of the program is completed, connect 10 pin FRC cables to the stepper motor section of the motor interfacing card. AS J5 (port 1) connected with J1 of motor card. Also J6 (port 2) connected with J17 of motor card and connect stepper motor to interfacing card.

JUmpers setting for stepper motor on motor interfacing card :-

- for JP4 short PAR and EN.
- for JP6, JP7 short stepper side.

Program :-

```
#include <reg51.h>
sbit  start = P2^0;
sbit  rev= P2^1;
sbit  stop=  P2^4;

sbit  IN1 = P1^0;
sbit  IN2 = P1^2;
sbit   IN3 = P1^3;
sbit  IN4 = P1^5;
sbit  EN1 = P1^1;
sbit  EN 2 = P1^6;

unsigned  int run=0,DIR;
 void  delay(unsigned  int t);
  void  rotation (void);

  int  main()
  {
       P1= 0x00;
       P2= 0x ff;
       EN1 =0;
       EN2= 0;
       while(1)
       {
            if(start==0)
            {
                 DIR= 1;
                 EN1=1;
                 EN2=1;
```

```
    run=1;
  }
 else if (rev==0)
     {
      DIR=0;
     }
 else if(stop==0)
     {
      P1=0x00;
          run=0;
     }
 if (run==1)
          rotation();
    }
}
 void rotation (void)
{
  if DIR==1)
     {
      IN1=0; IN2=0; IN3=1; IN4=1;
       delay (25);
      IN1=0; IN2=1; IN3=1; IN4=0;
       delay(25);
      IN1=1; IN2=1; IN3=0; IN4=0;
       delay (25);
      IN=1; IN2=0; IN3=0; IN4=1;
       delay(25);
    }
    if(DIR=0)
    {
```

```
IN1=1; IN2=0; IN3=0; IN4=1;
delay(25);
IN1=1; IN2=1; IN3=0; IN4=0;
delay(25);
IN1=0; IN2=1; IN3=1; IN4=0;
delay(25);
IN1=0; IN2=0; IN3=1; IN4=1;
delay(25);
}
}
void delay(unsigned int t)
{
 unsigned int i,j;
     for (i=0; i<t; i++)
     for(i=0;j<t; j++);
}
```

- Result: stepper motor translates electrical signal into mechanical movement.

By controlling are applied in the form of pulses. The sequence we can rotate the other in clockwise or anticlockwise direction.

Step no.	A	B	C	D	Direction	
					clockwise	anticlockwise
1	0	0	1	1	↓	↑
2	0	1	1	0		
3	1	1	0	0		
4	1	0	0	1		

- conclusion :- stepper motor can be easily interfaced to 8051 by using motor driver, the port P1 is interfaced to motor driver.

To drive the motor EN1 = EN2 = 1,

IN1, IN2, IN3, IN4 bits are used to drive the motor in clockwise or anticlockwise direction.

The three buttons start / reverse, and stop are interfaced to 8051 by using port P2.

when start buttons is pressed motor moves in forward direction when rev buttons is pressed motor moves in anticlockwise direction and when stop buttons is pressed motor stops.