DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING
SRM UNIVERSITY, Kattankulathur – 603203.

Title of Experiment:8.Transfer data serially between two kits-8051	
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Register Number	:RA1811005010278
Date of Experiment	:26-03-2021
Date of submission	**:26-03-2021**

S.NO :	MARKS SPLIT UP	MAXIMUM MARKS (50)	MARKS OBTAINED
1	PRE LAB	5	
2	PROGRAM	25	
3	EXECUTION	15	
4	POST LAB	5	
TOTAL		50	

Staff Signature

8. Transfer data serially between two kits -8051

PRE-LAB

1. **What is the difference between serial and parallel data transfer ?**
   Serial data transmission sends data bits one after another over a single channel. Parallel data transmission sends multiple data bits at the same time over multiple channels.

2. **What is simplex, Half Duplex and Full Duplex transfers?**
   Simplex mode is a unidirectional communication. Half duplex mode is a two-way directional communication but one at a time. Full duplex mode is a two-way directional communication simultaneously. Example of half duplex mode is: Walkie-Talkies.

3. **What are the two methods of Serial Data transfer?**
   Data is transferred in the form of bits between two or more digital devices. There are two methods used to transmit data between digital devices: serial transmission and parallel transmission. Serial data transmission sends data bits one after another over a single channel.

4. **Which is the most used serial I/O interfacing standard?**
   USB, HDMI, and RS-232

5. **What is the purpose of start and stop bits?**
   The start bit is used to signal the beginning of a frame. The stop bit is used to signal the end of a frame. The data is contained in the data bits and the parity bit is an extra bit that is often used to detect transmission errors.

8. Transfer data serially between two kits-8051

Aim:

To write an assembly language program Transmitting and Receiving the data between two kits.

11.4 Hardware Requirement:

The 8051 Microprocessor kit, Power Supply.

Software Requirement :

8051 EdSim

Algorithm:

1. Initialize TMOD with 20H
2. Set the values for TCON and SCON
3. Set the input address to DPTR
4. Based on the bit value on SCON store the data in SBUF
5. Increment DPTR and check for the loop end value

PROGRAM FOR RECEIVER.

Memory Location	Label	Opcode	Mnemonics	Comments
4100		75 89 20	MOV TMOD, #20H	
4103		75 8D A0	MOV TH1, #0A0H	
4106		75 8B 00	MOV TL1, #00H	
4109		75 88 40	MOV TCON, #40H	
410C		75 98 58	MOV SCON, #58H	
410F		90 45 00	MOV DPTR, #4500H	Output
4112	RELOAD	7D 05	MOV R5, #05H	
4114	CHECK	30 98 FD	JNB SCON.0, CHECK	
4117		C2 98	CLR SCON.0	
4119		E5 99	MOV A, SBUF	
411B		F0	MOVX @DPTR, A	
411C		A3	INC DPTR	
411D		B4 3F F2	CJNE A, #3FH, RELOAD	
4120		DD F2	DJNZ R5, CHECK	
4122		E4	CLR A	
4123		12 00 20	LCALL 0020H	

Algorithm for Transmitter:

1. Initialize TMOD with 20H
2. Set the values for TCON and SCON
3. Set the input address to DPTR
4. Based on the bit value on SCON store the data in SBUF and move the data to register ‘A’.
5. Increment DPTR and check for the loop end value

PROGRAM FOR TRANSMITTER.

Memory Location	Label	Opcode	Mnemonics	Comments
4100		75 89 20	MOV TMOD, #20H	
4103		75 8D A0	MOV TH1, #0A0H	
4106		75 8B 00	MOV TL1, #00H	
4109		75 88 40	MOV TCON, #40H	
410C		75 98 58	MOV SCON, #58H	
410F		90 45 00	MOV DPTR, #4500H	Input
4112	RELOAD	7D 05	MOV R5, #05H	
4114	REPEAT	E0	MOVX A, @DPTR	
4115		F5 99	MOV SBUF, A	
4117	CHECK	30 99 FD	JNB SCON.1, CHECK	
411A		C2 99	CLR SCON.1	
411C		A3	INC DPTR	
411D		B4 3F F2	CJNE A, #3FH, RELOAD	
4120		DD F2	DJNZ R5, REPEAT	
4122		E4	CLR A	
4123		12 00 20	LCALL 0020H	

SAMPLE INPUT AND OUTPUT:

Sl.No	Transmitter Input (Hex Values) Input Address 4500	Receiver Output (Hex Values)
1	00	00
2	11	11
3	22	22
4	33	33

EDSIM51 PROGRAM:Transfer data serially between two kits -8051

ADDRESS	MNEMONICS	OPCODE	COMMENTS
0000	**CLR SM0**	75 89 20	**clears (sets to 0) all the bit(s) of the indicated register sm0**
0002	**SETB SM1**	75 8D A0	**sets the bit operand to a value of 1. operate on the carry flag or any other directly addressable bit SM1**
0004	**MOV A, PCON**	75 8B 00	**store value in power control register to register A**
0006	**SETB ACC.7**	75 88 40	**sets the bit operand to a value of 1. operate on the carry flag or any other directly bit ACC addressable to 0.7**
0008	**MOV PCON, A**	75 98 58	**store value in power control register to register A**
000A	**MOV TMOD, #20H**	90 45 00	**set value of 20H to timer0 and timer1**
000D	**MOV TH1, #243**	7D 05	**move value of 243 toTH1 at baud rate 4800**

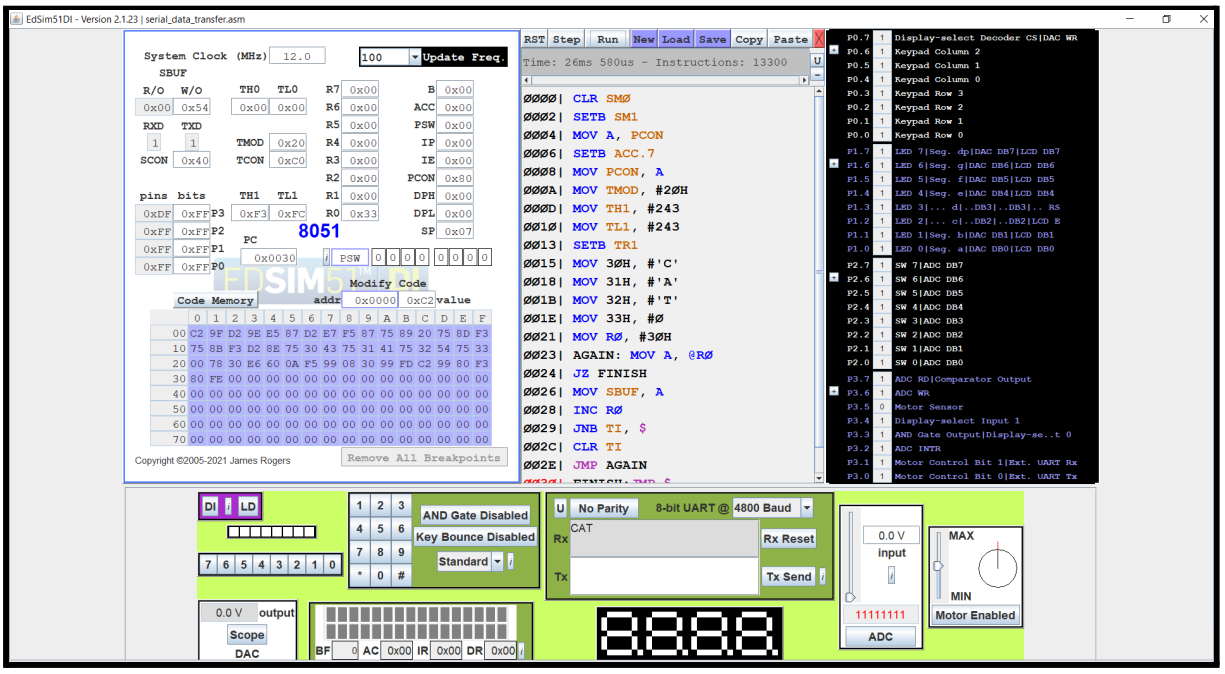
00010	**MOV TL1, #243**	E0	**move va;ue of 243 to TL1 at baud rate 4800**
00013	**SETB TR1**	F5 99	**sets the bit operand to a value of 1 addressable to TR1.**
00015	**MOV 30H, #'H'**	30 99 FD	**Store letter 'H'**
00018	**MOV 31H, #'A'**	C2 99	**Store letter 'A'**
0001B	**MOV 32H, #'I'**	A3	**Store 'I'**
0001E	**MOV 33H, #0**	B4 3F F2	**store value of address of 0 at 33h**
00021	**MOV R0,#30H**	DD F2	**store value of 30H at register R0**
00023	**MOV A, @R0**	E4	**store value indexed and addressed at R0 to A**
00024	**JZ FINISH**	12 00 20	**FINISH and jump at 0**
00026	**MOV SBUF, A**	75 89 20	**print the input letters at register RX**
00028	**INC R0**	75 8D A0	**increment R0 to next iteration**
00029	**JNB TI, $**	75 8B 00	**check for specific operand value of '0' at T1**
0002C	**CLR TI**	75 88 40	**clears (sets to 0) all the bit(s) of the indicated register**
0002E	**JMP AGAIN**	75 98 58	**Execute the code in loop**
00030	**JMP $**	90 45 00	**Run the program**

SAMPLE INPUT AND OUTPUT:

IN PUT ADDRESS	DATA
0015	‘C’
0018	‘A’
001B	‘T’
001E	0

OUTPUT ADDRESS	DATA
Rx	CAT
Tx	0
0026	C
0028	A
0028	T

SIMULATION:



Result:
Thus, the serial port programming in 8051 microcontroller is carried out through 8051 instructions.

POST-LAB

1. **What is meant by Baud Rate?**

   The baud rate is the rate at which information is transferred in a communication channel. Baud rate is commonly used when discussing electronics that use serial communication.

2. **What is the purpose of the SBUF register?**

   It's an 8 bit register used solely for serial communication in 8051. For a byte of data to be transferred via TxD line, it must be placed in the SBUF register. Similarly SBUF register holds the serially inputed data received by TxD line of 8051

3. **What is the purpose of the SCON register ?**

   control the Operation Modes of the Serial Port, Baud Rate of the Serial Port and Send or Receive Data using Serial Port. SCON Register also consists of bits that are automatically SET when a byte of data is transmitted or received.

4. **Which register has the SMOD bit, and What is its status when the 8051 is powered up?**

   After the SBUF contents are copied the RI flag bit must be cleared to 0. It is an 8-bit register.

   When 8051 is powered up, SMOD is zero.By setting the SMOD, baud rate can be doubled.

5. **Which timer of the 8051 is used to set the baud rate?**

   For the 8051 the Timer 1 is used to generate the baud rate in Auto reload mode. The crystal frequency Fosc is divided by 12 internally which is used to execute instructions also known as Machine Clock, Mosc.