CLASS : S.E. COMP **SUBJECT : DEL**

EXPT. NO. : 3 **DATE :**

TITLE : BCD ADDER/ 9'S COMPLEMENT CIRCUIT

OBJECTIVE :

1. Design and Implement BCD Adder circuit using IC-74LS83
2. Design and Implement 9's Complement circuit using IC-74LS83

APPARATUS :

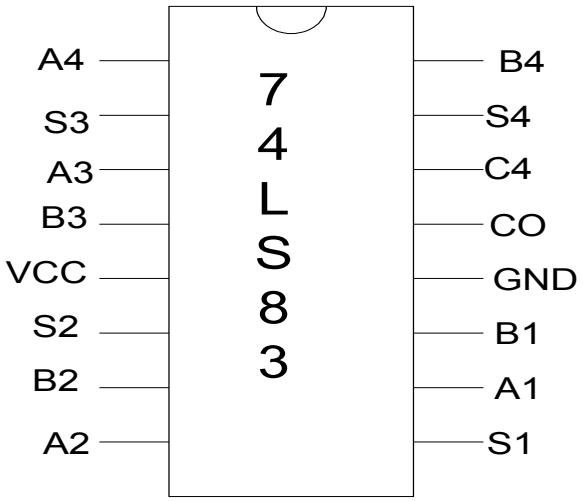
Digital-Board, GP-4 Patch-Cords, IC-74LS83, IC-74LS32, IC-74LS04/IC-74LS08 and Required Logic gates if any

THEORY :

IC 74LS83 is a 4-bit binary parallel adder. By using 74LS83 we can implement BCD adder. BCD means Binary coded Decimal. BCD numbers are valid from 0 to 9. For BCD adder when addition is below 9, carry is 0 result is valid BCD. When addition is more than 9 and carry is 0 as well as when addition is more than 15 and carry is 1 result of binary adder IC is Invalid BCD. We can convert invalid BCD to valid BCD by adding six. Max addition (9+9) result is 18 if carry input is 0 and 19 if carry input is 1. Thus for binary result greater than 9 six should be added to the result as a correction factor using combinational circuit.

74LS83 can also be used to implement the BCD subtractor. For BCD subtraction first we have to find 9's complements. To find 9's complements using IC-74LS83, first find 1's complement of a given number then add to 1010.

PIN Diagram :



PROCEDURE :

1. Make the connections as per the Logic circuit of 1 digit BCD adder using IC74LS83 and Verify its Truth Table.
2. Make the connections as per the Logic circuit of 9's complement circuits using IC74LS83 and Verify its Truth Table.

Design of BCD Adder using IC-74LS83:

SUM					
Dec.Equ.	S4	S3	S2	S1	Tens Place O/P
0	0	0	0	0	
1	0	0	0	1	
2	0	0	1	0	
3	0	0	1	1	
4	0	1	0	0	
5	0	1	0	1	
6	0	1	1	0	
7	0	1	1	1	
8	1	0	0	0	
9	1	0	0	1	
10	1	0	1	0	
11	1	1	0	1	
12	1	1	0	0	
13	1	1	0	1	
14	1	1	1	0	
15	1	1	1	1	

K-map Simplification:

Logical Expression:

Logic Diagram:

Design of 9's complement circuit using IC-74LS83:

Logic Diagram:

Logic Gates / MSI Device required for Implementation:

Sr.No.	Title	Name of the IC	Number of Gates required	IC Required
01	BCD Adder Circuit			
02	9's complement Circuit			

CONCLUSION:

REFFRENCE:

1. **R.P.Jain "Modern Digital Electronics" TMH 4th Edition**
2. **D.Leach,Malvino,Saha,"Digital Principles and Applications",TMH**

Subject teacher Sign with Date Remark