4. Pack the two unpacked BCD numbers stored in memory locations 4200H and 4201H and store result in memory location 4300H. Assume the least significant digit is stored at 4200H.

Program:

# PACK AND UNPACK

LDA 4200H

MOV B, A

LDA 4201H

RRC

RRC

RRC

RRC

ORA B

STA 4300H

HLT

5. Two digit BCD number is stored in memory location 4200H. Unpack the BCD number and store the two digits in memory locations 4300H and 4301H such that memory location 4300H will have lower BCD digit.

LDA 4200H

MVI B, 0FH

ANA B

STA 4201H

LDA 4200H

MVI B, F0H

ANA B

RRC

RRC

RRC

RRC

STA 4202H

HLT

6. Write a set of instructions to alter the contents of flag register in 8085.

7. Calculate the sum of series of numbers. The length of the series is in memory location 2200H and the series begins from memory location 2201H.

a) Consider the sum to be 8 bit number. So, ignore carries. Store the sum at memory location 2300H.

b) Consider the sum to be 16 bit number. Store the sum at memory locations 2300H and 2301H.

# lab report 3

Certainly! Here's the **final Lab Report 03** with all requested details — title, objective, questions (before each program), programs, outputs, conclusion, and **flowcharts** for Q4 and Q5 included as ASCII diagrams for easy reference.

**🔷 Lab Report 03**

**📌 Title:**

BCD Packing & Unpacking, Flag Control, and Series Sum

**🎯 Objective:**

To perform BCD packing and unpacking operations, alter flag register contents, and calculate the sum of series numbers using 8085 instructions.

**❓ Question 4:**

Pack the two unpacked BCD numbers stored in memory locations 4200H and 4201H and store result in memory location 4300H. Assume the least significant digit is stored at 4200H.

**🧑‍💻 Program 4: Pack BCD digits**

LDA 4200H ; Load LSD into A (e.g., 05H)

MOV B, A ; Store LSD in B

LDA 4201H ; Load MSD into A (e.g., 09H)

RRC ; Rotate right 1 bit

RRC

RRC

RRC ; MSD becomes 90H

ORA B ; Combine MSD and LSD

STA 4300H ; Store packed BCD

HLT

**✅ Output 4:**

Input:

* 4200H = 05H (LSD)
* 4201H = 09H (MSD)

Output:

* 4300H = 95H (Packed BCD)

**🔁 Flowchart 4: BCD Packing**

Start

|

v

Load 4200H into A

|

v

Move A to B (store LSD)

|

v

Load 4201H into A

|

v

Rotate A right 4 times (RRC x4)

|

v

OR A with B (combine nibbles)

|

v

Store A into 4300H

|

v

Stop

**❓ Question 5:**

Two digit BCD number is stored in memory location 4200H. Unpack the BCD number and store the two digits in memory locations 4300H and 4301H such that memory location 4300H will have lower BCD digit.

**🧑‍💻 Program 5: Unpack BCD digits**

LDA 4200H ; Load packed BCD (e.g., 95H)

MVI B, 0FH

ANA B ; Mask upper nibble → get LSD

STA 4300H ; Store LSD

LDA 4200H

MVI B, F0H

ANA B ; Mask lower nibble → get MSD

RRC

RRC

RRC

RRC ; Rotate right 4 times to shift MSD

STA 4301H ; Store MSD

HLT

**✅ Output 5:**

Input:

* 4200H = 95H (Packed BCD)

Output:

* 4300H = 05H (LSD)
* 4301H = 09H (MSD)

**🔁 Flowchart 5: BCD Unpacking**

Start

|

v

Load 4200H into A

|

v

Load 0FH into B

|

v

ANA B (mask upper nibble → LSD)

|

v

Store A to 4300H (LSD)

|

v

Load 4200H into A again

|

v

Load F0H into B

|

v

ANA B (mask lower nibble → MSD)

|

v

Rotate A right 4 times (RRC x4)

|

v

Store A to 4301H (MSD)

|

v

Stop

**❓ Question 6:**

Write a set of instructions to alter the contents of flag register in 8085.

**🧑‍💻 Program 6: Alter flag register (example)**

MVI A, 09H

ADI 09H ; 09 + 09 = 12 (sets flags)

DAA ; Decimal adjust, affects Carry and Auxiliary Carry flags

HLT

**✅ Output 6:**

* Result in A: 18H (BCD adjusted)
* Flags affected: Auxiliary Carry set, Carry possibly set, Zero, Sign, Parity updated accordingly.

**❓ Question 7a:**

Calculate the sum of series of numbers. The length of the series is in memory location 2200H and the series begins from memory location 2201H.  
Consider the sum to be 8 bit number. So, ignore carries. Store the sum at memory location 2300H.

**🧑‍💻 Program 7a: 8-bit sum ignoring carry**

LDA 2200H ; Load length

MOV C, A ; Store count

MVI D, 00H ; Clear sum

LXI H, 2201H ; Point to series

NEXT:

MOV A, M ; Load current number

ADD D ; Add to sum

MOV D, A ; Store sum

INX H ; Next number

DCR C

JNZ NEXT

MOV A, D

STA 2300H ; Store sum

HLT

**✅ Output 7a:**

* Input: Count=3, numbers=01H, 02H, 03H
* Output: Sum = 06H stored at 2300H

**❓ Question 7b:**

Calculate the sum of series of numbers. The length of the series is in memory location 2200H and the series begins from memory location 2201H.  
Consider the sum to be 16 bit number. Store the sum at memory locations 2300H and 2301H.

**🧑‍💻 Program 7b: 16-bit sum**

LDA 2200H

MOV C, A

LXI H, 2201H

LXI D, 0000H ; DE holds sum

NEXT16:

MOV A, M

MOV B, 00H

ADD E

MOV E, A

MOV A, B

ADC D

MOV D, A

INX H

DCR C

JNZ NEXT16

MOV A, E

STA 2300H

MOV A, D

STA 2301H

HLT

**✅ Output 7b:**

* Input: Count=4, numbers=10H, 20H, 30H, 40H
* Output: Sum = 00A0H stored as
  + 2300H = A0H (low byte)
  + 2301H = 00H (high byte)

**✅ Conclusion:**

The lab successfully demonstrated the process of BCD packing and unpacking using bitwise masking and rotations. It also showed how arithmetic instructions affect the flag register and provided examples for summing series with 8-bit and 16-bit results in 8085 assembly. Understanding these fundamentals is key to effective microprocessor programming and data manipulation.

If you want, I can help you generate these flowcharts as images or prepare this report in Word/PDF format.