INTERNATIONAL ISLAMIC UNIVERSITY, ISLAMABAD
FACULTY OF BASIC and APPLIED SCIENCES
DEPARTMENT OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

Terminal Examinations, Spring 2020

Course Title: Computer Organization and Assembly Language	**Course Code: CS322**
Program: BS Computer Science	**Batch: BSCS F17 A & B**
Total Marks: (60 marks for BS/MA/ M.Sc. (50 marks for MBA/ MS/Ph.D.)	**Date & Time: 15-Aug-2020 (04:00 pm)**
Credit Hours: 04	**Teacher Name: Mr. Asim Munir**

Q. No.	Marks Obtained
1	
2	
3	
Total for Semester Exam	
Mid-term Marks	
Total Marks out of 100	

Student Name: MUHAMMAD SAFIULLAH
Student Registration Number: 4000-FBAS/BSCS/F18/A

Instructions for Students:

Before starting your open book examination, please read all the given below instructions carefully, and must follow these instructions carefully. You must affirm the honesty pledge given at the end:

1. Download the question paper titled as **"COALQuestion Paper.pdf" (pdf file)**and answer-sheet titled as **"COAL_Answer-Booklet.docx" (MS Word document)** from the Google Classroom as per instructions of your teacher. You are required to write down the answers to each question in your own handwriting on neat white papers with any blue pen.
2. **Maximum time to download question paper, attempt and submit/ upload your answer sheets is 8 HOURS. As soon as you finish your paper** Upload your answer booklet on priority basis. soon. You can only upload your exam response **once.** You will be unable to re-upload an additional or amended version. If you fail to submit it within the due time, your paper will be considered cancelled.

3. **How to submit(upload) your answer-booklet/paper**:

   After completing your answers, you need to:

   a. Mention/write your **Name** and **Registration Number**, **Page number** and **sign** on each page of your handwritten answer-sheet.
   b. Take pictures using mobile camera or Scan each page of your written answers /answer sheets via any scanning software (as guided in the video tutorial).
   c. Insert all pictures or scanned images of your answer sheets into the MS word file titled as **"COAL_Answer-Booklet.docx"** provided by the teacher in the Google Classroom.
   d. After inserting all the images, save the **"COAL_Answer-Booklet.docx"** file as a single PDF file **(Only PDF format is acceptable as your answer-booklet),** and upload it in the Google Forms (link of which is provided in the Google Classroom).
   e. Please make sure you upload the correct document as you will not be able to change this, once it has been submitted.
   (Please see the video tutorial regarding procedure to upload the examination responses, shared in the Google classroom).

4. The University views copying from one another's examination paper/ cheating, giving or receiving unpermitted aid, discussion/consultation, plagiarism, impersonation during an examination, as serious disciplinary offences that may fall under the category of Use of Unfair Means and will be dealt as per university rules for UMCC.

5. Before starting your examination, you must agree to and sign the following pledge by having a click on the Student's Affirmation check box (it is mandatory to Tick the Checkbox):

   "I hereby affirm that i) I shall solve this paper on my own and I shall not seek the help of any person(s) with any sort of aid (like telephonic/verbal help, attempted answers related to my examination etc.) while taking my paper,(ii) or will not provide assistance of any sort (verbal or written) to otherfellow students. If I am found involved in i) cheating ii) impersonation, iii) or using plagiarized content in my writing, my case may be dealt as per university rules and procedures for using unfair means."

   Student's Affirmation: ☐

[Start Inserting Images on Page No. 3]

Q1.
Insert Pictures of Answer Sheet Here

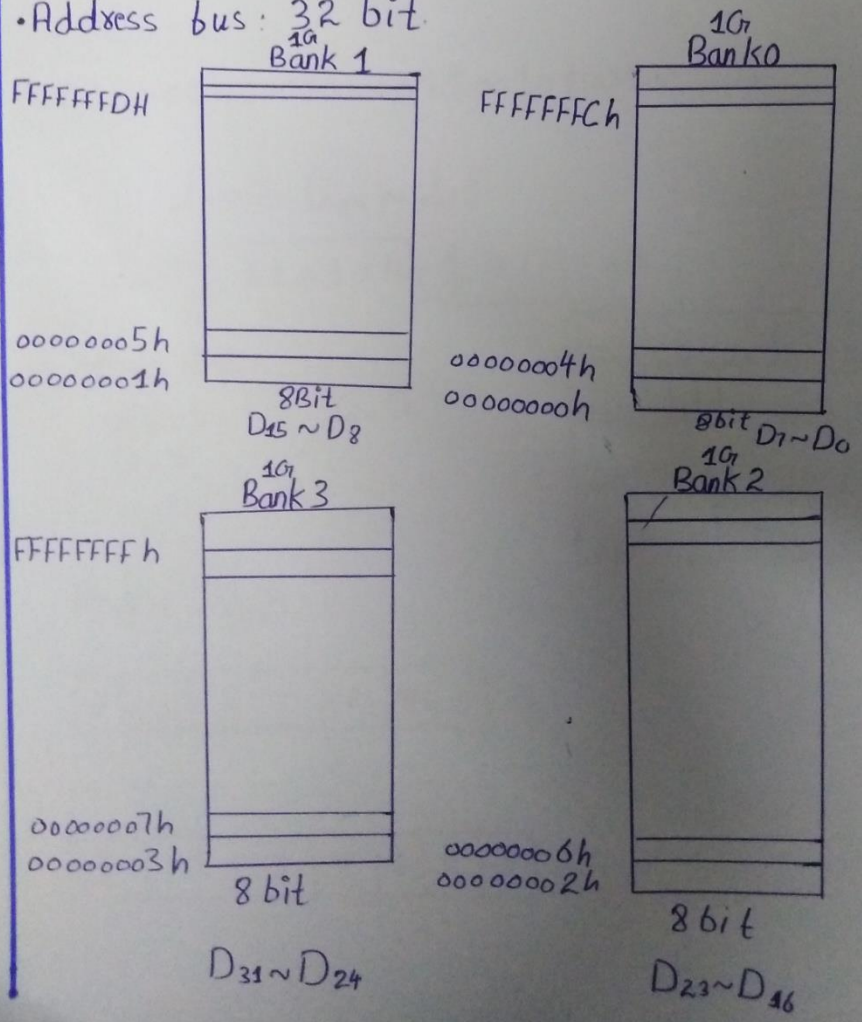
(1) NAME : Muhammad Safiullah
REG No. 4000-FBAS/BSCS/F18(A)

Q No 1(A)

Solution:-

Four banks are used to access the memory bank. 44 bytes (2^{32}) bytes of memory can be accessed through it. Each bank size is 1 Gigabyte.

- Data bus : 32 bit
- Address bus : 32 bit



Muhammad Safiullah

QNo 1

(b)

Solution:

Base ($B_{31} - B_0$)

1000000000 ÷ 0000 1100 1010 0100 1101
CALID

00000000000000001100101001001101

Limit ($L_{19} \sim L_0$)

D_8BD = 1101 0110 1 0111101

misc Bits:-

AV = 1 ; G = 0
D = 1 ;

00000000	0 1 0 1 000
1111111110	0000 0000
1100 1010	0100 1101
1101 0110	1011 1101

Access Rights :-

P	DPC	S	E	ED/C	RW	A
1	1	1	1	1	1	0

Muhammad Safiullah

Q No 1
(C)

Intel's Pentium Processor: Pentium Processor was the first X86 processor with superscalar architecture. It also features a 64-bit external data bus, which doubles the amount of information it is possible to read or write on each memory access.

Pentium processor contain's two full processor's combined into one with each of 32-bits, So it's overall data requirement was 64 bit So it has 64 bit data bus. It has 2 ALU's doing 32 bit operations.

- How many address lines are needed for decoding?

→ For Pentium processor we have 8 locations and each have 8 bits.
→ If we assume No. of address line is (n) = 1 we can only address 2 locations (0 & 1)
→ IF n=2 we can address 4 locations (0, 1, 2, 3)
→ No. of address locations are 8, so $8 = 2^n$
→ So, $n = \log(8)$ to the base 2

$\therefore \boxed{n = 3}$

Therefore '3' address lines are needed for decoding.

Muhammad Safiullah

Q No. 1

(D)

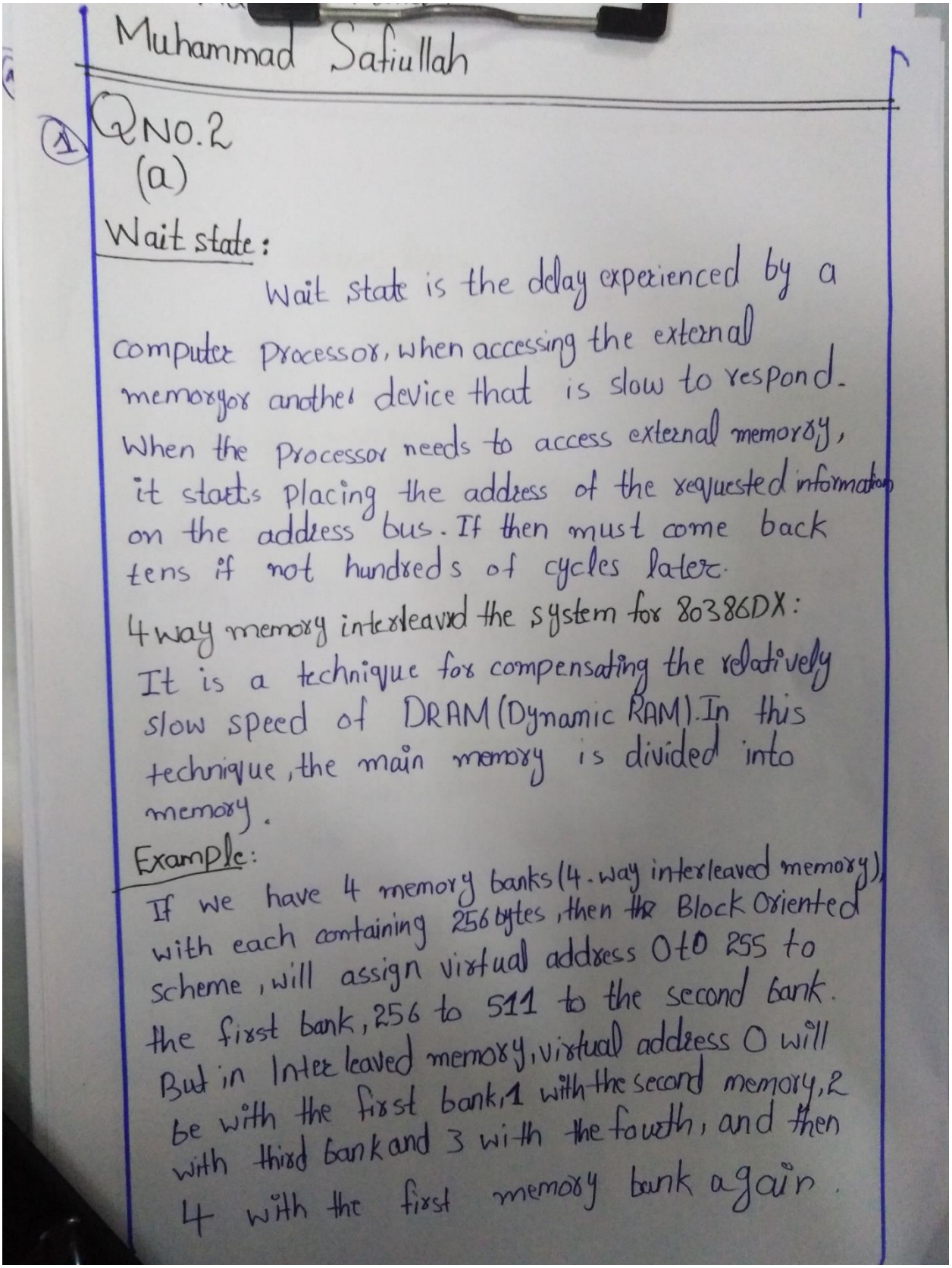
A selector can Point out 8192 entries.

As the maximum entries that a selector can Point out are 8192 and selector selects from descriptor table which is of 8 bytes so,

$8 \times 8192 = 64KB$

Therefore, a descriptor table requires 64 KB of Memory.

Q2.
Insert Pictures of Answer Sheet Here



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Q No. 2

(a)

Wait state:

Wait state is the delay experienced by a computer processor, when accessing the external memory or another device that is slow to respond. When the processor needs to access external memory, it starts placing the address of the requested information on the address bus. If then must come back tens if not hundreds of cycles later.

4 way memory interleaved the system for 80386DX:

It is a technique for compensating the relatively slow speed of DRAM (Dynamic RAM). In this technique, the main memory is divided into memory.

Example:

If we have 4 memory banks (4-way interleaved memory) with each containing 256 bytes, then the Block Oriented scheme, will assign virtual address 0 to 255 to the first bank, 256 to 511 to the second bank. But in Interleaved memory, virtual address 0 will be with the first bank, 1 with the second memory, 2 with third bank and 3 with the fourth, and then 4 with the first memory bank again.

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(2)

Q No 2.

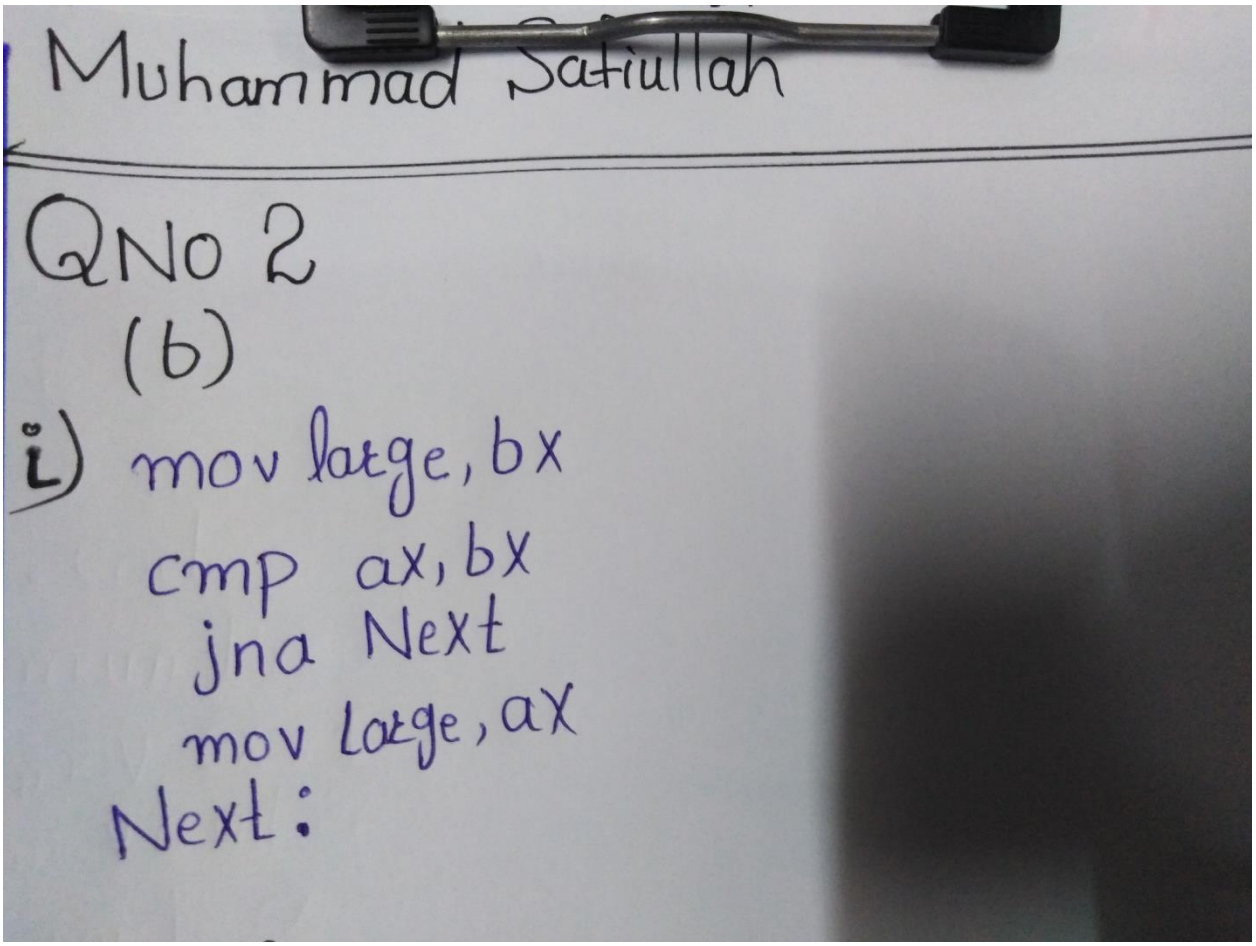
(a)

Four set of address line:-

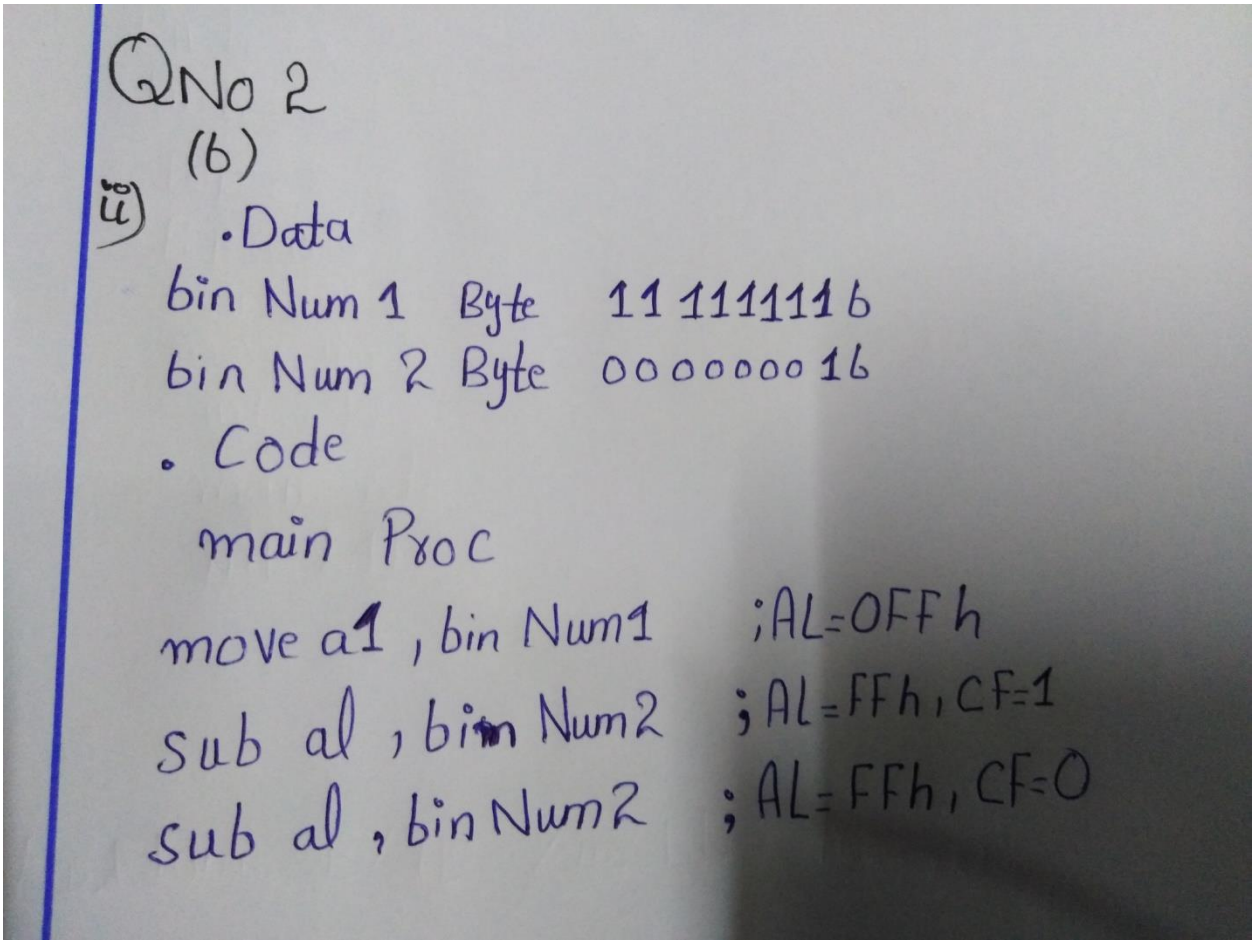
The four set of address lines are engaged to generate addresses for consecutively stored data in memory to reduce the wait states of micro-processor.

Wait state is a delay experienced by a microprocessor when accessing external memory or another device. If after sending an address and the microprocessor does not receive a Ready input from memory, it enters a wait state for as long as the Ready input from memory, it enters a wait state for as long as the Ready line is in 0 state. When the memory access is completed the Ready goes high to indicates that the memory is ready for specified transfer.

a. Compare unsigned AX to BX, and copy the larger of the two into a variable named LARGE.



b. Mention two different methods to clear Carry FLAG (CF).



c. Swap the values of register CX and variable COUNT without using XCHG.

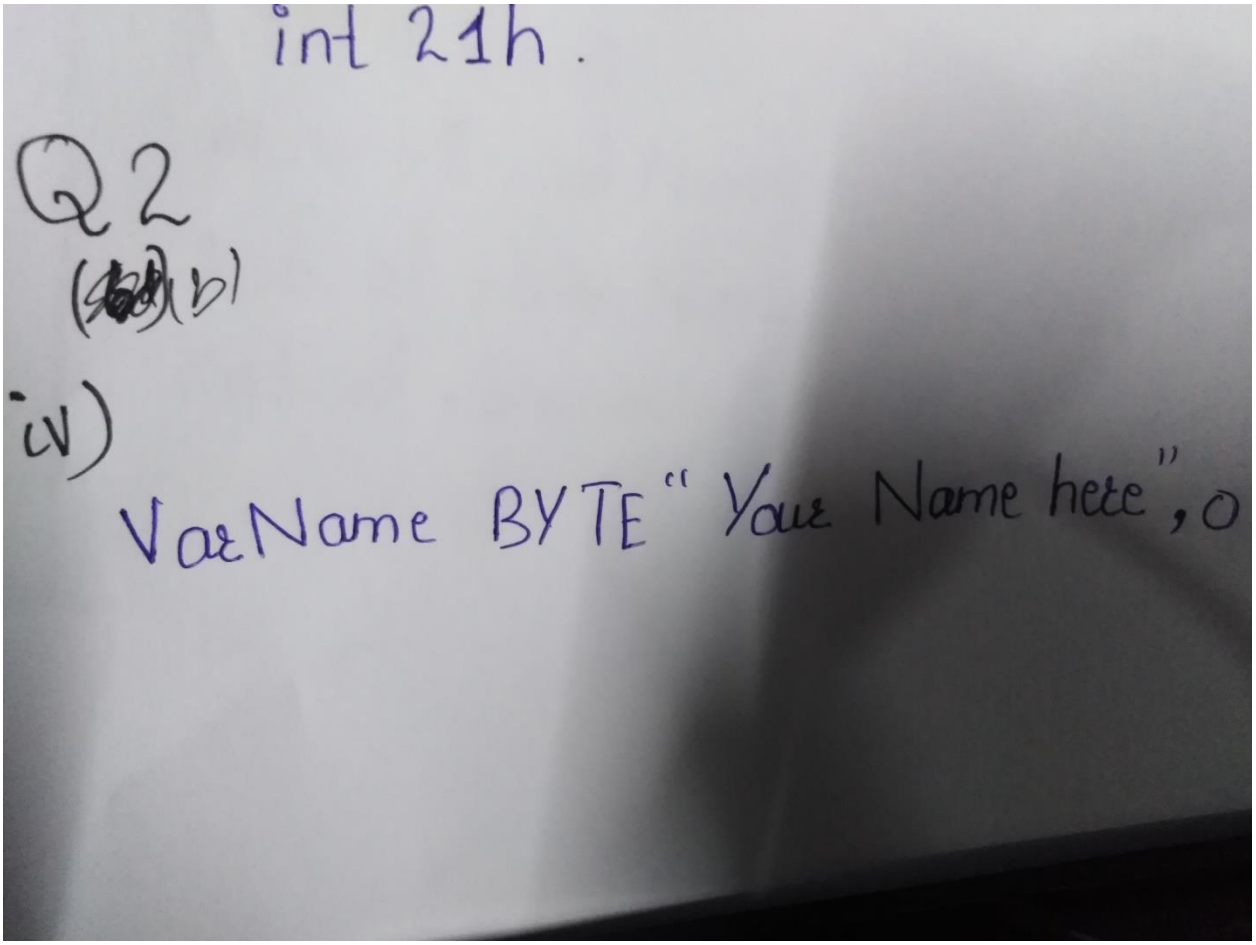
Q2

(b)

iii)

```
. Code
main Proc
mov cx ,'1'
mov count ,'2'
  Push cx
  Push count
   Pop cx
   Pop count
   mov dx, cx
   move ah, 2
    int 21h
   main endP
    int 21h.
```

d. Initialize a string with your full name.



Q3.

Insert Pictures of Answer Sheet Here

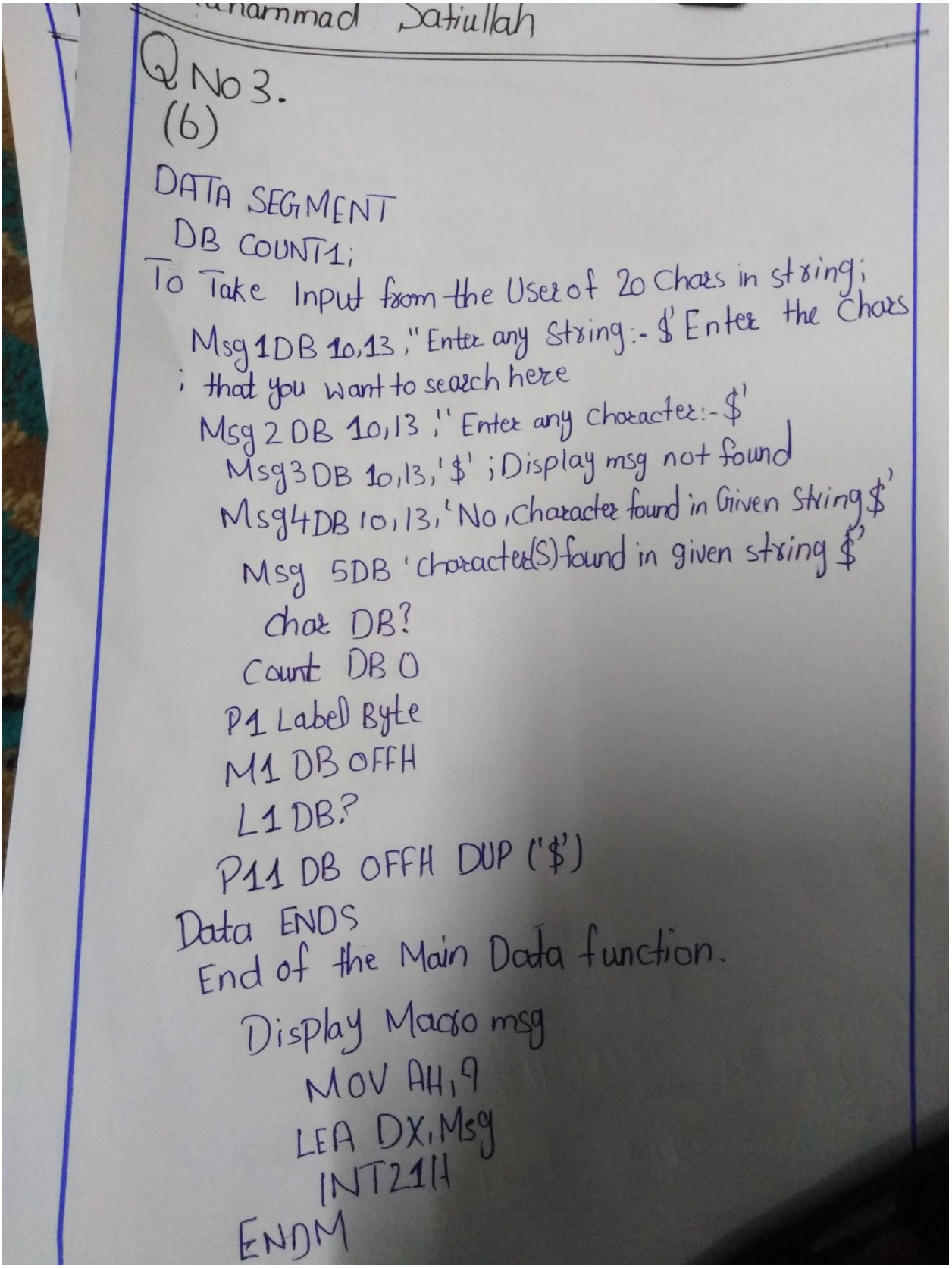
Muhammad Safiullah

Q No. 3

(a)

Solution:

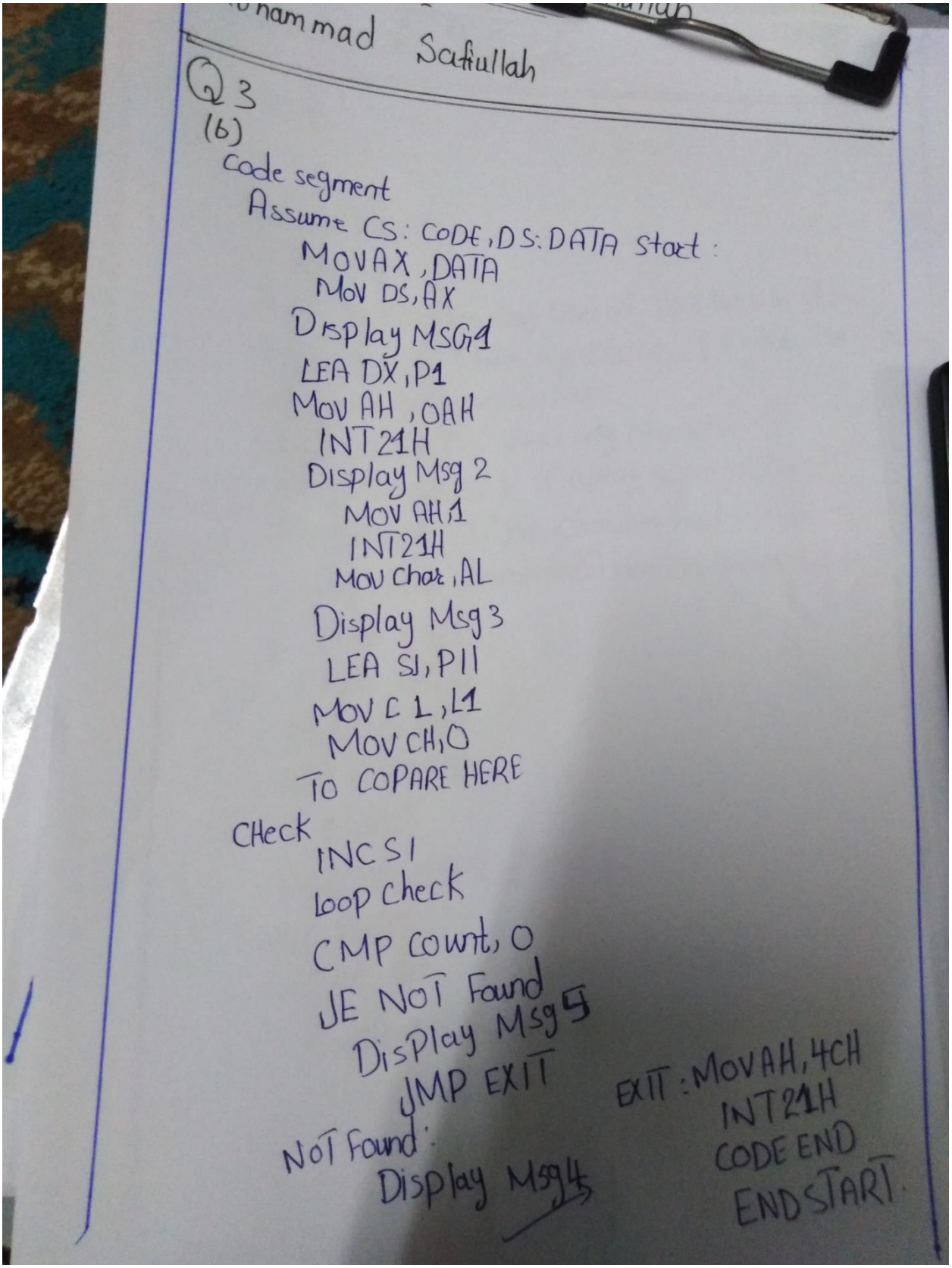
```
                SIZE OF
byte1   BYTE 10,20,30      ; a. 3
array1  WORD DUP(?),0,0    ; b. 64
array2  WORD 5 DUP(3 DUP(?)); c 30
array3  DWORD 1,2,3,4      ; d. 16

mov cx, SIZE OF array1 ;     64
```



Muhammad Safiullah

Q No 3.
(6)

```
DATA SEGMENT
 DB COUNT1;
To Take Input from the User of 20 Chars in string;
 Msg1DB 10,13,"Enter any String:-$'Enter the Chars
; that you want to search here
 Msg2 DB 10,13,"Enter any character:-$'
  Msg3DB 10,13,'$' ;Display msg not found
  Msg4DB 10,13,'No,Character found in Given String$'
   Msg 5DB 'character(S)found in given string $'
    char DB?
    Count DB 0
   P1 Label Byte
   M1 DB OFFH
   L1 DB?
  P11 DB OFFH DUP ('$')
Data ENDS
 End of the Main Data function.
   Display Macro msg
      MOV AH,9
      LEA DX,Msg
       INT21H
   ENDM
```



hammad Safiullah

Q3
(b)

```
code segment
Assume CS: CODE, DS: DATA start:
    MOV AX, DATA
    MOV DS, AX
    Display MSG1
    LEA DX, P1
    MOV AH, 0AH
    INT 21H
    Display Msg 2
    MOV AH, 1
    INT 21H
    MOV char, AL
    Display Msg 3
    LEA SI, P11
    MOV C 1, L1
    MOV CH, 0
    TO COPARE HERE
CHeck
    INC SI
    loop check
    CMP count, 0
    JE NOT Found
    Display Msg 5
    JMP EXIT
NOT Found:
    Display Msg 4
EXIT: MOV AH, 4CH
    INT 21H
CODE END
END START.
```