AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH
Faculty of Science and Technology
Department of Computer Science
COE 3205 Computer Organization and Architecture (Section: J)

WORKSHEET 1F

QUESTION 1: CONVERT THE FOLLOWING PSEUDOCODE TO ASSEMBLY

PSEUDOCODE

```
DL = 'A'
CX = 26
While CX != 0:
    print DL
    DL = DL + 1
    CX = CX - 1
```

ASSEMBLY CODE

```
.MODEL SMALL
.STACK 100h
.DATA
.CODE
MAIN PROC
        MOV  AH, 2          ; DOS print-character
        MOV  DL, 'A'        ; starting character
        MOV  CX, 26         ; loop counter

PRINT_LOOP:
        INT  21h            ; print character in DL
        INC  DL             ; next character
        DEC  CX             ; one iteration finished
        CMP CX, 0
        JNE PRINT_LOOP    ; (1) fill: loop while CX != 0

        MOV  AH, 4Ch
        INT  21h
MAIN ENDP
END MAIN
```

QUESTION 2: CONVERT THE FOLLOWING PSEUDOCODE TO ASSEMBLY

DATA SECTION

```
.DATA
array  DB  -5, 10, -3, 0, 7, -1
len    EQU  ($ - array)   ; length of array
```

PSEUDOCODE

```
BL = 0              ; count = 0
for each element x in array:
    if x < 0 (signed):
        BL = BL + 1
```

ASSEMBLY

```
.CODE
MAIN PROC
        MOV  CX, len          ; number of elements
        LEA  SI, array        ; pointer to current element
        MOV  BL, 0            ; BL = count of negatives

NEXT_ITEM:
        MOV  AL, [SI]         ; load current element
        CMP  AL, 0
        JGE NOT_NEG         ; (1) jump if AL >= 0 (signed)

        ; AL < 0: negative element
        INC  BL               ; increment negative counter

NOT_NEG:
        INC  SI               ; move to next byte
        DEC  CX               ; one element processed
        JNZ NEXT_ITEM       ; (2) repeat while CX != 0

        ; (at this point BL contains the number of negative elements)

        MOV  AH, 4Ch
        INT  21h
MAIN ENDP
END MAIN
```

QUESTION 3

```
CMP   CX, 0           ; unsigned comparison with 0
JAE   CX_IS_GE_ZERO   ; jump if CX >= 0   (unsigned, JAE/JNB)
```

1. CF = 0, ZF = 0
2. CF = 0, ZF = 1
3. CF = 1, ZF = 0

For each case, answer:

- "CX ≥ 0 (jump taken)" **or**
- "CX < 0 (jump not taken)".

CF	**ZF**	**Jump?**	**Interpretation**
0	0	Taken	CX ≥ 0
0	1	Taken	CX ≥ 0 (equal)
1	0	Not taken	CX < 0

QUESTION 4

Which flags do these jump commands check

- **JAE or JNB ➔ CF = 0**
- **JBE or JNA ➔ CF=1 or ZF = 1**
- **JNO ➔ OF = 1**
- **JE or JZ ➔ ZF = 1**