Kingdom of Saudi Arabia
Ministry of Education
College of Computer
Department of Computer Engineering

Course Code and Name : Language Programming COE224
Final Exam
472 Date: 15-6-2026 Duration:2hour

Student Name:	Student ID:

The exam starts here

Question 1 (25 marks) **:**

Trace the execution of the following Assembly instructions and write the required register and flag values.

a) For instructions (2), (4), and (6), determine the value of the register in **hexadecimal**, and determine the values of CF and OF (9 marks)

`mov al,80h`			
`Neg al`	**AL =**	**CF=**	**OF=**
`mov ax,7FFFh`			
`add ax,0001h`	**AL =**	**CF=**	**OF=**
`mov al,80h`			
`sub al,01h`	**AL =**	**CF=**	**OF=**

b) For each instruction, determine the values of DX, AX, CF, and OF. Write register values in **hexadecimal** (8 marks)

`mov ax,8001h`	**DX :**	**AX :**	**CF :**	**OF :**
`mul ax`				
`mov ax,8001h`	**DX :**	**AX :**	**CF :**	**OF :**
`imul ax`				

c) For each instruction, determine the value of BL in **binary** and the value of CF (8 marks)

`clc`	**CF = 0**	
`mov bl,88h`	**CF =**	**BL =**
`rcl bl,1`	**CF =**	**BL =**
`ror bl,1`	**CF =**	**BL =**
`rcl bl,1`	**CF =**	**BL =**

Question 2 (7 marks) **:**

Explain the difference between the LOOP and LOOPZ instructions, including the condition required for each instruction to repeat

Question 3 (8 marks) **:**

Write an Assembly language program segment to implement the following expression using signed arithmetic instructions. Use IDIV and CDQ.

$$\boldsymbol{Var_4 = Var_3} \,\%\, (-\boldsymbol{Var_1} \,\%\, \boldsymbol{Var_2})$$

Question 4 (10 marks) **:**

Classify the following Assembly instructions into the correct categories

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JG , IMUL , TEST , IDIV , JA , JBE , AND , XOR , JL , CMP
```

a) Bitwise (Logical) operation instructions used for bit manipulation:
Answer:

b) Unsigned comparison and conditional branching instructions:
Answer:

c) Signed arithmetic operation instructions:
Answer:

d) Signed comparison and conditional branching instructions:
Answer:

e) Instructions that affect processor flags without modifying operands**:**
Answer:

**********END OF EXAM**********

May Allah grant you success in dunya and akhira