

Lab 1

True/False Questions (Refined and Validated):

1. The MOV AX, BX instruction transfers the contents of the BX register into the AX register.
True
 2. The MUL BL instruction stores the result of multiplying BL in the BX register.
False (Result is stored in AX)
 3. The CMP instruction changes the flag register but does not alter the operand values.
True
 4. The .CODE directive indicates the start of the code segment in an assembly program.
True
 5. The XOR AX, AX instruction sets all bits in the AX register to 1.
False (It clears the AX register by setting all bits to 0.)
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MCQs (Refined for Importance):

1. **What does the directive .DATA indicate in an assembly program?**
 - a. The start of the data segment
 - b. The start of the code segment
 - c. A comment in the program
 - d. A label for variables**Answer: a**
2. **Which instruction clears the contents of the AX register?**
 - a. NEG AX
 - b. XOR AX, AX
 - c. MOV AX, 0
 - d. CMP AX, AX**Answer: b**
3. **What is the purpose of the ORG 0100h directive in an assembly program?**
 - a. To define the start of the code segment
 - b. To initialize the data segment
 - c. To set the starting address of the program
 - d. To declare variables**Answer: c**
4. **In the instruction ADD AX, CX, what happens?**
 - a. CX is added to AX, and the result is stored in CX.
 - b. AX is added to CX, and the result is stored in CX.
 - c. CX is added to AX, and the result is stored in AX.
 - d. The sum of AX and CX is stored in both AX and CX.**Answer: c**

5. **Which instruction increments the value in the BX register by 1?**

- a. ADD BX, 1
- b. INC BX
- c. DEC BX
- d. CMP BX, 1

Answer: b

6. **What does the CMP AX, 0054H instruction do?**

- a. Adds 0054H to AX.
- b. Compares AX with 0054H and sets the flags accordingly.
- c. Subtracts 0054H from AX and stores the result in AX.
- d. Clears the contents of AX.

Answer: b

7. **What happens when the instruction DIV CL is executed?**

- a. The value in AX is divided by CL, and the quotient is stored in AX.
- b. The value in AX is divided by CL, and the quotient is stored in CL.
- c. The value in CL is divided by AX, and the quotient is stored in AX.
- d. The value in CL is divided by AX, and the quotient is stored in CL.

Answer: a

8. **In the instruction MOV [BX], AL, what does [BX] represent?**

- a. The contents of the BX register.
- b. The memory address stored in the BX register.
- c. A direct memory address.
- d. A constant value.

Answer: b

True/False Questions (Importance Filtered):

- 1. The ORG directive sets the starting address of the program.
True
- 2. Arithmetic operations like ADD require at least one operand to be a register.
True
- 3. The result of the MUL BL operation is always stored in the BL register.
False (Stored in AX)
- 4. The DEC BX instruction decreases the BX register value by 2.
False (Decreases by 1)
- 5. The NEG AX instruction negates the value in the AX register.
True

Lab 2

True/False Questions:

1. The INT instruction is used to invoke DOS or BIOS routines.
True
 2. The INT 21h instruction always displays a character on the screen.
False (It depends on the function number in AH.)
 3. The MOV AH, 1 and INT 21h combination is used for single-key input.
True
 4. A conditional jump is always executed regardless of the flag register's status.
False (Conditional jumps depend on specific flag values.)
 5. The JZ instruction transfers control if the zero flag (ZF) is set.
True
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Sort Questions:

Sort by Functionality of INT 21h Functions:

Given the function numbers 1, 2, and 9 for INT 21h, sort their functionality:

- a. Single-key input
- b. Character string output
- c. Single-key output

Answer: a → c → b

Sort by Control Transfer Conditions:

Sort the following conditional jumps by their behavior:

- a. JNZ
- b. JL
- c. JGE
- d. JZ

Answer:

- JZ: Jump if zero flag (ZF) = 1
 - JNZ: Jump if zero flag (ZF) = 0
 - JL: Jump if less
 - JGE: Jump if greater than or equal
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Multiple Choice Questions (MCQs):

1. **What does the INT 21h instruction do?**

- a. Transfers control to the flag register
- b. Invokes a DOS function based on the value in AH
- c. Executes a conditional jump based on CF
- d. Displays a character string

Answer: b

2. **Which INT 21h function number is used for single-key input?**

- a. 1
- b. 2
- c. 9
- d. 4

Answer: a

3. **What is stored in the AL register after executing MOV AH, 1 and INT 21h?**

- a. ASCII code of the key pressed if it's a character key
- b. Zero flag if no key is pressed
- c. Address of the next instruction
- d. Memory address of the key pressed

Answer: a

4. **What happens when MOV AH, 2 and INT 21h are executed with MOV DL, 'A'?**

- a. The ASCII code of A is stored in AL.
- b. The character A is displayed on the screen.
- c. The flag register is cleared.
- d. A new line is created.

Answer: b

5. **Which conditional jump is executed when the carry flag (CF) is set?**

- a. JZ
- b. JB
- c. JG
- d. JGE

Answer: b

6. **The CMP destination, source instruction sets flags based on what operation?**

- a. Addition
- b. Subtraction
- c. Multiplication
- d. Division

Answer: b

7. **Which of the following is true about JLE?**

- a. It jumps if the destination is greater than the source.
- b. It jumps if the destination is less than or equal to the source.

- c. It jumps if the carry flag is set.
- d. It jumps unconditionally.

Answer: b

8. **What does the JNZ instruction do?**

- a. Jumps if the zero flag (ZF) is set.
- b. Jumps if the zero flag (ZF) is cleared.
- c. Jumps if the carry flag (CF) is set.
- d. Jumps unconditionally.

Answer: b

Lab 4

True/False Questions:

1. The IF-THEN structure can be implemented in assembly using CMP and conditional jumps like JNL or JL.
True
2. In the CASE structure, the JMP instruction is used to skip to the end of the case after executing a specific branch.
True
3. The AND condition in assembly requires both conditions to be true for execution to proceed.
True
4. A FOR loop in assembly uses the CX register as a counter and decrements it automatically with each iteration.
True
5. The WHILE loop always executes its body at least once.
False (It checks the condition at the top and may not execute at all if the condition is initially false.)
6. The REPEAT loop executes the loop body first and checks the termination condition afterward.
True
7. In the OR condition, the JE instruction is used to check if either condition is met.
True

Sort Questions:

Sort by Execution Flow in Control Structures:

- a. IF-THEN
- b. IF-THEN-ELSE

- c. CASE
- d. FOR loop
- e. WHILE loop

Answer: a → b → c → e → d

Sort by Conditional Instructions:

- a. CMP
- b. JE
- c. JNL
- d. JMP

Answer: a → c → b → d

Multiple Choice Questions (MCQs):

1. Which instruction is used to compare two values in an IF-THEN structure?
 - a. MOV
 - b. CMP
 - c. JMP
 - d. ADD

Answer: b

2. In an IF-THEN-ELSE structure, what happens when the condition is false?
 - a. Control moves to the true-branch.
 - b. Control moves to the false-branch.
 - c. The program terminates.
 - d. The condition is re-evaluated.

Answer: b

3. What register is commonly used to control the iteration count in a FOR loop?
 - a. AX
 - b. CX
 - c. BX
 - d. DX

Answer: b

4. Which of the following control structures checks the condition at the end of the loop?
 - a. FOR loop
 - b. WHILE loop
 - c. REPEAT loop
 - d. CASE

Answer: c

5. **What is the termination condition for the example WHILE loop counting characters?**
- a. When DX equals 0.
 - b. When a blank character is encountered.
 - c. When the carriage-return (0Dh) is read.
 - d. When CX becomes zero.

Answer: c

6. **In the CASE structure, how is control transferred to the appropriate branch?**
- a. Using CMP followed by JMP.
 - b. Using only CMP.
 - c. Using MOV and INT.
 - d. Using nested loops.

Answer: a

7. **In the AND condition example, how is the uppercase range verified?**
- a. By comparing with 'A' and 'Z' using two CMP instructions.
 - b. By directly checking ASCII values in the AH register.
 - c. By storing the character in BX for comparison.
 - d. By using a CASE structure.

Answer: a

8. **Which instruction is used to display a character in assembly?**
- a. MOV AH, 1
 - b. MOV DL, AL
 - c. INT 21h with AH=2
 - d. JMP Display

Answer: c

9. **In the OR condition example, what happens if neither condition is met?**
- a. The character is displayed.
 - b. The program terminates.
 - c. The condition is re-evaluated.
 - d. A blank is displayed.

Answer: b

10. **What is the purpose of the LOOP instruction in a FOR loop?**
- a. To increment the counter in CX.
 - b. To display the current character.
 - c. To decrement CX and repeat the loop if CX \neq 0.
 - d. To check the loop condition at the end.

Answer: c

Lab 5

True/False Questions

1. The AND instruction modifies the Carry Flag (CF) and Overflow Flag (OF).
False (CF and OF are set to 0, not modified by the result.)

2. The result of a NOT operation is stored in the destination operand.
True
 3. Memory-to-memory operations are allowed for logic instructions like AND, OR, and XOR.
False (Memory-to-memory operations are not allowed.)
 4. The XOR instruction can be used to clear the contents of a register.
True
 5. The OR instruction sets the Zero Flag (ZF) if the result of the operation is zero.
True
 6. The NOT instruction affects the status flags such as Zero Flag (ZF) and Sign Flag (SF).
False (The NOT instruction does not affect the flags.)
 7. The destination operand in logic instructions must always be a register.
False (The destination can be a register or memory location.)
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Sort Questions

Sort by Instruction Operation:

- a. AND
- b. OR
- c. XOR
- d. NOT

Answer: a → b → c → d

Sort by Effect on Flags:

- a. CF and OF = 0
- b. No effect on flags
- c. SF, ZF, PF reflect the result

Answer: c → a → b

Multiple Choice Questions (MCQs)

1. Which flags are affected by the AND instruction?
 - a. SF, ZF, and PF
 - b. CF and OF
 - c. None of the flags
 - d. All flags

Answer: a

2. **What does the NOT instruction perform?**

- a. Logical AND operation
- b. Logical OR operation
- c. One's complement operation
- d. Logical XOR operation

Answer: c

3. **Which of the following operations cannot have memory as both operands?**

- a. AND
- b. OR
- c. XOR
- d. All of the above

Answer: d

4. **What is the effect of XOR AX, AX?**

- a. Sets all bits of AX to 1.
- b. Clears the AX register to 0.
- c. Inverts all bits of AX.
- d. Sets only the Carry Flag (CF).

Answer: b

5. **What happens when the OR instruction's result is zero?**

- a. ZF is set to 1.
- b. ZF is cleared to 0.
- c. CF is set to 1.
- d. SF is cleared to 0.

Answer: a

6. **Which logic instruction is used to convert an ASCII lowercase letter to an uppercase letter?**

- a. AND
- b. OR
- c. XOR
- d. NOT

Answer: a

7. **Which of the following logic instructions has no effect on the status flags?**

- a. AND
- b. OR
- c. XOR
- d. NOT

Answer: d

8. **What is a typical use of the OR instruction?**

- a. Clear a register
- b. Complement all bits in a register
- c. Test if a register is zero

d. Shift bits in a register

Answer: c

9. Which instruction is used to clear specific bits in a register?

- a. OR
- b. AND
- c. XOR
- d. NOT

Answer: b

10. What happens to the Overflow Flag (OF) after executing an AND instruction?

- a. It is set to 1.
- b. It is cleared to 0.
- c. It depends on the result.
- d. It remains unchanged.

Answer: b

True/False Questions

- 1. The AND instruction can be used to set specific destination bits while preserving others.
False (It clears specific bits.)
 - 2. The TEST instruction performs an AND operation without modifying the destination operand.
True
 - 3. The SHL instruction always shifts a 0 into the rightmost bit of the destination.
True
 - 4. The SAR instruction retains the sign bit during a right shift.
True
 - 5. The ROL instruction shifts the MSB into the CF and the rightmost bit position.
True
 - 6. The SHR instruction is used for signed arithmetic right shifts.
False (The SHR instruction performs unsigned right shifts.)
 - 7. In the ROR instruction, the bit shifted out of the rightmost position is discarded.
False (It is moved into the MSB and CF.)
 - 8. The SAL and SHL instructions produce identical results.
True
 - 9. The XOR instruction can be used to complement specific bits in a register.
True
 - 10. The OF flag is reliable for detecting overflow in a multiple left shift operation.
False (It reflects only the result of the last shift.)
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Short Questions

1. **What is a mask, and how is it used in bit manipulation?**

A mask is a bit pattern used with logic instructions like AND, OR, and XOR to selectively modify bits in a destination operand.

2. **Explain the purpose of the TEST instruction.**

The TEST instruction performs an AND operation between the source and destination operands to set the status flags without modifying the destination operand.

3. **What is the difference between SHR and SAR instructions?**

- SHR: Shifts bits to the right, inserting a 0 into the MSB (unsigned shift).
- SAR: Shifts bits to the right, retaining the MSB value (signed shift).

4. **How does the ROL instruction differ from the ROR instruction?**

- ROL rotates bits to the left, moving the MSB to the LSB and CF.
- ROR rotates bits to the right, moving the LSB to the MSB and CF.

5. **Give an example of when you might use the XOR instruction.**

To clear a register (e.g., XOR AX, AX) or to toggle specific bits in a register.

Multiple Choice Questions (MCQs)

1. **Which instruction is used to clear specific bits in a register?**

- a. AND
- b. OR
- c. XOR
- d. NOT

Answer: a

2. **What does the TEST instruction do?**

- a. Performs an OR operation without modifying the destination
- b. Performs an AND operation without modifying the destination
- c. Performs a XOR operation without modifying the destination
- d. Shifts bits without modifying the destination

Answer: b

3. **Which flag reflects the bit shifted out during a SHL operation?**

- a. ZF
- b. OF
- c. CF
- d. SF

Answer: c

4. **What is the primary purpose of the SAL instruction?**

- a. Rotate bits to the left
- b. Perform an arithmetic left shift
- c. Complement bits
- d. Shift bits to the right

Answer: b

5. **What happens when a SHR operation is performed on an odd binary number?**

- a. It is divided by 2 and rounded up.
- b. It is divided by 2 and rounded down.
- c. It remains the same.
- d. Overflow occurs.

Answer: b

6. **What is the effect of the XOR AX, AX instruction?**

- a. Sets all bits in AX to 1.
- b. Clears all bits in AX.
- c. Inverts all bits in AX.
- d. Rotates bits in AX.

Answer: b

7. **Which instruction can retain the sign bit during a right shift?**

- a. SHL
- b. SHR
- c. SAL
- d. SAR

Answer: d

8. **How can you count the number of 1 bits in a register using ROL?**

- a. By testing the CF after each rotation.
- b. By testing the ZF after each rotation.
- c. By testing the SF after each rotation.
- d. By testing the OF after each rotation.

Answer: a

9. **Which instruction doubles the value of a binary number?**

- a. SHR
- b. SAL
- c. ROR
- d. AND

Answer: b

10. **What does the ROR instruction do?**

- a. Rotates bits to the left and stores the MSB in CF.
- b. Rotates bits to the right and stores the LSB in CF.
- c. Shifts bits to the right, discarding the LSB.

d. Shifts bits to the left, discarding the MSB.

Answer: b

True/False Questions

1. The RCL instruction includes the carry flag (CF) as part of the rotation.
True
 2. The RCR instruction shifts the LSB into the CF and the CF into the MSB.
True
 3. The MUL instruction is used for signed multiplication.
False (It is for unsigned multiplication.)
 4. Overflow can occur during division if the quotient is too large to fit in the destination.
True
 5. The CWD instruction prepares the DX register as the sign extension of AX for word division.
True
 6. The IMUL instruction produces the same result as MUL for positive numbers.
True
 7. The RCR instruction moves the MSB into the LSB directly, bypassing CF.
False (The MSB is shifted via CF.)
 8. The IDIV instruction sets the remainder to have the same sign as the dividend.
True
 9. The DIV instruction leaves all status flags undefined after execution.
True
 10. The CBW instruction converts a word into a double word.
False (It converts a byte into a word.)
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Short Questions

1. **What is the primary difference between the ROL and RCL instructions?**
The ROL instruction rotates bits within the destination operand, while RCL includes the carry flag (CF) as part of the rotation.
2. **How does the MUL instruction store its result for word multiplication?**
The least significant 16 bits are stored in AX, and the most significant 16 bits are stored in DX.
3. **Why is the CWD instruction used before a signed division?**
To extend the sign of AX into DX, ensuring the dividend is correctly prepared for signed division.
4. **What happens if a division operation results in a quotient that is too large?**
A "Divide Overflow" error occurs, terminating the program.

5. **What is the difference between DIV and IDIV instructions?**

DIV is for unsigned division, while IDIV is for signed division.

Multiple Choice Questions (MCQs)

1. **Which instruction rotates bits to the left through the carry flag?**

- a. ROL
- b. RCL
- c. ROR
- d. RCR

Answer: b

2. **In signed multiplication, which instruction is used?**

- a. MUL
- b. IMUL
- c. DIV
- d. IDIV

Answer: b

3. **What is the purpose of the CBW instruction?**

- a. Convert a word to a double word
- b. Convert a byte to a word
- c. Clear the AX register
- d. Prepare DX for division

Answer: b

4. **What happens to the remainder after an IDIV operation?**

- a. It is always positive.
- b. It is always zero.
- c. It has the same sign as the divisor.
- d. It has the same sign as the dividend.

Answer: d

5. **Which instruction is used to divide a 32-bit signed dividend by a 16-bit divisor?**

- a. DIV
- b. IDIV
- c. MUL
- d. IMUL

Answer: b

6. **If AX contains -1250 and BX contains 7, which instruction prepares DX for division?**

- a. MOV
- b. CWD
- c. CBW
- d. IDIV

Answer: b

7. **What does the carry flag (CF) contain after a single RCR instruction?**
a. The original MSB
b. The original LSB
c. The value of CF before rotation
d. Always 0
Answer: b
8. **What happens when you execute DIV with a divisor much smaller than the dividend?**
a. Normal division
b. Undefined result
c. Divide Overflow error
d. Zero quotient
Answer: c
9. **Which instruction includes CF as part of the rotation and shifts bits to the right?**
a. ROL
b. RCR
c. ROR
d. RCL
Answer: b
10. **What will be the quotient and remainder if DX=0000h, AX=0005h, and BX=0002h after DIV BX?**
a. Quotient = 2, Remainder = 1
b. Quotient = 2, Remainder = 2
c. Quotient = 1, Remainder = 1
d. Quotient = 1, Remainder = 2
Answer: a

Lab 6

MCQs

1. **What does the instruction RCL do?**
a. Rotates bits to the left without including the carry flag.
b. Rotates bits to the left through the carry flag.
c. Rotates bits to the right through the carry flag.
d. None of the above.
Answer: b
2. **Which of the following is true about the MUL instruction?**
a. It performs signed multiplication.
b. It produces a result in DX:AX for byte multiplication.
c. It produces a result in AX for word multiplication.
d. None of the above.
Answer: d
3. **What does DUP do in array declarations?**
a. It duplicates an instruction.

- b. It defines an array with repeated values.
- c. It removes duplicates from an array.
- d. None of the above.

Answer: b

4. What is the effect of DIV if the divisor is zero?

- a. Returns zero.
- b. Causes a "Divide Overflow" error.
- c. Terminates the program without an error.
- d. Skips the operation.

Answer: b

5. Which interrupt function is used to display a string in assembly language?

- a. INT 21h, AH=1
- b. INT 21h, AH=2
- c. INT 21h, AH=9
- d. INT 21h, AH=4C

Answer: c

True/False

1. IMUL performs unsigned multiplication.

False

2. In the RCR instruction, the least significant bit is shifted into the carry flag.

True

3. DW can be used to declare strings in assembly language.

False

4. In the IDIV instruction, the remainder has the same sign as the dividend.

True

5. The instruction CWD is used to sign-extend a byte to a word.

False (It extends a word to a double word.)

Short Questions

1. What is the purpose of the LEA instruction?

Answer: It loads the effective address of a memory operand into a register.

2. Explain the difference between RCL and ROL.

Answer: RCL rotates bits to the left through the carry flag, while ROL rotates bits to the left without involving the carry flag.

3. What happens when the quotient in a DIV operation exceeds the size of the destination?

Answer: A "Divide Overflow" error occurs, and the program terminates.

4. **How does the AND instruction help in converting lowercase to uppercase in ASCII?**

Answer: By performing AND with 0DFh, the 6th bit (which differentiates lowercase and uppercase) is cleared, converting the character to uppercase.

5. **Write an example of an array declaration using DUP.**

Answer: array DB 5 DUP(0) defines an array with 5 zeros.