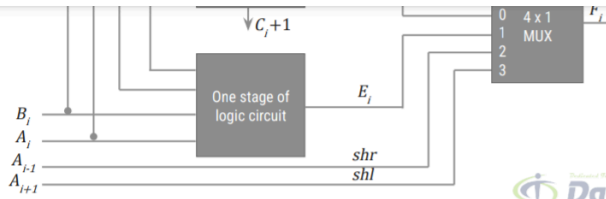


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#3140707 (COA) • Unit 1 – Computer Data Representation & Register Transfer and Micro-operation

51

4 - bit Arithmetic Logic Shift Unit

| S ₃ | S ₂ | S ₁ | S ₀ | C _{in} | Operation | Function |
|----------------|----------------|----------------|----------------|-----------------|------------------|----------------------|
| 0 | 0 | 0 | 0 | 0 | $F = A$ | Transfer A |
| 0 | 0 | 0 | 0 | 1 | $F = A + 1$ | Increment A |
| 0 | 0 | 0 | 1 | 0 | $F = A + B$ | Addition |
| 0 | 0 | 0 | 1 | 1 | $F = A + B + 1$ | Add with carry |
| 0 | 0 | 1 | 0 | 0 | $F = A + B'$ | Subtract with borrow |
| 0 | 0 | 1 | 0 | 1 | $F = A + B' + 1$ | Subtraction |
| 0 | 0 | 1 | 1 | 0 | $F = A - 1$ | Decrement |

| S ₃ | S ₂ | S ₁ | S ₀ | C _{in} | Operation | Function |
|----------------|----------------|----------------|----------------|-----------------|------------------|----------------------|
| 0 | 0 | 1 | 1 | 1 | $F = A$ | Transfer A |
| 0 | 1 | 0 | 0 | x | | AND |
| 0 | 1 | 0 | 1 | x | | OR |
| 0 | 1 | 1 | 0 | x | $F = A \oplus B$ | XOR |
| 0 | 1 | 1 | 1 | x | $F = A'$ | Complement A |
| 1 | 0 | x | x | x | $F = shr A$ | Shift right A into F |
| 1 | 1 | x | x | x | $F = shl A$ | Shift left A into F |

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52

Questions asked in GTU exam

- What do you mean by register transfer? Explain in detail. Also discuss three-state bus buffer.
- List and explain types of shift operations on accumulator.
- Define RTL. Explain how register transfer takes place in basic computer system.
- What is multiplexing? Explain the multiplexing of control signals in ALU.
- Explain how complement number system is useful in computer system. Discuss any one complement number system with example.
- Draw the block diagram of 4-bit arithmetic circuit and explain it in detail.
- Explain shift micro operations and Draw neat and clean diagram for 4-bit combinational circuit shifter.
- Explain hardware implementation of common bus system using three state buffers. Mention assumptions if required.
- Explain 4-bit adder-subtractor with diagram.
- Explain floating point representation.
- What is a Digital Computer System? Explain the role of binary number system in it.
- Design a digital circuit for 4-bit binary adder.

Prof. Krunal D. Vyass

#3140707 (COA) • Unit 1 – Computer Data Representation & Register Transfer and Micro-operation

53

Questions asked in GTU exam

- Represent $(8620)_{10}$ in (1) binary (2) Excess-3 code and (3) 2421 code.
- Explain selective set, selective complement and selective clear.
- How negative integer number represented in memory? Explain with suitable example.
- Explain Micro operation.
- What does this mean: $R2 \leftarrow R1$?
- What does this mean: $T0: R4 \leftarrow R0$?
- What is a Bus?
- What is an ALU?
- Represent the following conditional control statement(s) by two register transfer statements with control function. If $(P=1)$ then $(R1 \leftarrow R2)$ else if $(Q=1)$ then $(R1 \leftarrow R3)$
- State true or false: In binary number system, $B - A$ is equivalent to $B + A' + 1$.
- Draw a diagram of 4-bit binary incrementer and explain it briefly.

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54