**INSTRUCTION SET**

**00: Direct Addressing**

**Digital / Analog**

**01: Register Addressing**

**10: Immediate Addressing**

**1: Analog**

**0: Digital**

**Instruction Type**

**Addressing Mode**

**11: Indirect Addressing**

**Operation**

|  |  |  |
| --- | --- | --- |
| **Arithmetic Instruction** |  |  |
| **ADD\_D** | **00000000** |  |
| **SUB\_D** | **00000001** |  |
| **MUL\_D** | **00000010** |  |
| **DIV\_D** | **00000011** |  |
| **Logical Instruction** |  |  |
| **AND\_D** | **00000100** |  |
| **OR\_D** | **00000101** |  |
| **NOT\_D** | **00000110** |  |
| **XOR\_D** | **00000111** |  |
| **Data Transfer Instruction** |  |  |
| **MOV\_D** | **00001000** |  |
| **LODE\_D** | **00001001** |  |
| **STORE\_D** | **00001010** |  |
| **IN\_D** | **00001011** |  |
| **Data manipulation Instruction** |  |  |
| **PUSH** | **00001100** |  |
| **POP** | **00001101** |  |
| **SHL** | **00001110** |  |
| **SHR** | **00001111** |  |
| **Machine Control Instruction** |  |  |
| **HLT** | **00010000** |  |
| **CLC** | **00010001** |  |
| **STC** | **00010010** |  |
| **STI** | **00010011** |  |
| **Subroutine Instruction** |  |  |
| **CALL** | **00010100** |  |
| **RET** | **00010101** |  |
|  | **00010110** |  |
|  | **00010111** |  |
| **Branch Instruction** |  |  |
| **JMP** | **00011000** |  |
| **JC** | **00011001** |  |
| **JZ** | **00011010** |  |
| **JNZ** | **00011011** |  |
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|  | **00011000** |  |
|  | **00011001** |  |
|  | **00011010** |  |
|  | **00011011** |  |
| **Arithmetic Instruction** |  |  |
| **ADD\_R** | **00100000** |  |
| **SUB\_R** | **00100001** |  |
| **MUL\_R** | **00100010** |  |
| **DIV\_R** | **00100011** |  |
| **Logical Instruction** |  |  |
| **AND\_R** | **00100100** |  |
| **OR\_R** | **00100101** |  |
| **NOT\_R** | **00100110** |  |
| **XOR\_R** | **00100111** |  |
| **Data Transfer Instruction** |  |  |
| **MOV\_R** | **00101000** |  |
| **LODE\_R** | **00101001** |  |
| **STORE\_R** | **00101010** |  |
| **IN\_R** | **00101011** |  |
| **Data manipulation Instruction** |  |  |
|  | **00101100** |  |
|  | **00101101** |  |
|  | **00101110** |  |
|  | **00101111** |  |
| **Machine Control Instruction** |  |  |
|  | **00110000** |  |
|  | **00110001** |  |
|  | **00110010** |  |
|  | **00110011** |  |
| **Subroutine Instruction** |  |  |
|  | **00110100** |  |
|  | **00110101** |  |
|  | **00110110** |  |
|  | **00110111** |  |
| **Branch Instruction** |  |  |
|  | **00111000** |  |
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|  | **00111100** |  |
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| **Arithmetic Instruction** |  |  |
| **ADD\_IM** | **01000000** |  |
| **SUB\_IM** | **01000001** |  |
| **MUL\_IM** | **01000010** |  |
| **DIV\_IM** | **01000011** |  |
| **Logical Instruction** |  |  |
| **AND\_IM** | **01000100** |  |
| **OR\_IM** | **01000101** |  |
| **NOT\_IM** | **01000110** |  |
| **XOR\_IM** | **01000111** |  |
| **Data Transfer Instruction** |  |  |
| **MOV\_IM** | **01001000** |  |
| **LODE\_IM** | **01001001** |  |
| **STORE\_IM** | **01001010** |  |
| **IN\_IM** | **01001011** |  |
| **Data manipulation Instruction** |  |  |
|  | **01001100** |  |
|  | **01001101** |  |
|  | **01001110** |  |
|  | **01001111** |  |
| **Machine Control Instruction** |  |  |
|  | **01010000** |  |
|  | **01010001** |  |
|  | **01010010** |  |
|  | **01010011** |  |
| **Subroutine Instruction** |  |  |
|  | **01010100** |  |
|  | **01010101** |  |
|  | **01010110** |  |
|  | **01010111** |  |
| **Branch Instruction** |  |  |
|  | **01011000** |  |
|  | **01011001** |  |
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| **Arithmetic Instruction** |  |  |
| **ADD\_I** | **01000000** |  |
| **SUB\_I** | **01000001** |  |
| **MUL\_I** | **01000010** |  |
| **DIV\_I** | **01000011** |  |
| **Logical Instruction** |  |  |
| **AND\_I** | **01000100** |  |
| **OR\_I** | **01000101** |  |
| **NOT\_I** | **01000110** |  |
| **XOR\_I** | **01000111** |  |
| **Data Transfer Instruction** |  |  |
| **MOV\_I** | **01001000** |  |
| **LODE\_I** | **01001001** |  |
| **STORE\_I** | **01001010** |  |
| **IN\_I** | **01001011** |  |
| **Data manipulation Instruction** |  |  |
|  | **01001100** |  |
|  | **01001101** |  |
|  | **01001110** |  |
|  | **01001111** |  |
| **Machine Control Instruction** |  |  |
|  | **01010000** |  |
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| **Subroutine Instruction** |  |  |
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| **Branch Instruction** |  |  |
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