|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **R-Type** | | | | | | | |
| func7  31:25 | rs2  24:20 | rs1  19:15 | funct3  14:12 | Rd description | Rd value  11:7 | Op  6:0 | hex-code |
| 0000000 | 00010 | 00001 | 000 | rd=rs1-rs2 | 00011 | 0110011(51) | 002081B3 |
| 0100000 | 00010 | 00001 | 000 | rd=rs1-rs2 | 00011 | 0110011(51) | 402081B3 |
| 0000000 | 00010 | 00001 | 001 | rd=rs1<<rs2 | 00011 | 0110011(51) | 002091B3 |
| 0000000 | 00010 | 00001 | 010 | rd=rs1<rs2 | 00011 | 0110011(51) | 0020A1B3 |
| 0000000 | 00010 | 00001 | 100 | rd=rs1^rs2 | 00011 | 0110011(51) | 0020C1B3 |
| 0000000 | 00010 | 00001 | 101 | rd=rs1>>rs2 | 00011 | 0110011(51) | 0020D1B3 |
| 0000000 | 00010 | 00001 | 110 | rd= rs1|rs2 | 00011 | 0110011(51) | 0020E1B3 |
| 0000000 | 00010 | 00001 | 111 | rd=rs1&rs2 | 00011 | 0110011(51) | 0020F1B3 |

**I-Type**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Imm  31:20 | rs1  19:15 | funct3  14:12 | Rd(description) | Rd value  11:7 | Op  6:0 | hex-code |
| 000001001101 | 00000 | 010 | LOAD rd = [ addr (= imm (rs1)) ] | 00101 | 0000011(3) | 04D02283 |
| 000001001101 | 00001 | 000 | rd=rs1 +signExt(imm) | 00011 | 0010011(19) | 04D08193 |
| 000001001101 | 00001 | 001 | rd=rs1<<uimm | 00011 | 0010011(19) | 04D09193 |
| 000001001101 | 00001 | 010 | rd=rs1 < SignExit(imm) | 00011 | 0010011(19) | 04D0A193 |
| 000001001101 | 00001 | 100 | rd=rs1 ^ SignExit(imm) | 00011 | 0010011(19) | 04D0B193 |
| 000001001101 | 00001 | 101 | rd=rs1 >> uimm | 00011 | 0010011(19) | 04D0C193 |
| 000001001101 | 00001 | 110 | rd=rs1 | signExt(imm) | 00011 | 0010011(19) | 04D0D193 |
| 000001001101 | 00001 | 111 | rd=rs1 & signExt(imm) | 00011 | 0010011(19) | 04D0E193 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S-Type** | | | | | | | |
| imm11:5  31:25 | rs2  24:20 | rs1  19:15 | funct3  14:12 | desp | Imm4:0  11:7 | Op  6:0 | hex-code |
| 0000000 | 00010 | 00000 | 010 | [ addr = imm(rs1) ]= rs2 | 01010 | 0100011(35) | 00201523 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **B-Type** | | | | | | | |
| imm11:5  31:25 | rs2  24:20 | rs1  19:15 | funct3  14:12 | desp | Imm4:0  11:7 | Op  6:0 | hex-code |
| 1111111 | 00010 | 00000 | 000 | rd=(rs1 == rs2) PC = BTA | 10100 | 1100011(99) | FE200A62 |
| 1111111 | 00010 | 00000 | 001 | rd=(rs1 != rs2) PC = BTA | 10100 | 1100011(99) | FE201A62 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **J-Type** | | | | | |
| Imm19:0  31: 12 | desp | rd  11:7 | | Op  6:0 | hex-code |
| 11111111111111110100 | PC=JTA, rd= PC +4 | 00111 | 1101111(111) | | FFFF42EF |

**Vector R-Type**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **R-Type** | | | | | | | |
| func7  31:25 | rs2  24:20 | rs1  19:15 | funct3  14:12 | Rd description | Rd value  11:7 | Op  6:0 | hex-code |
| 0000000 | 00100 | 00011 | 000 | rd=rs1+rs2 | 00101 | 0011000(24) | 00418298 |
| 0000000 | 00100 | 00011 | 001 | rd=rs1-rs2 | 00101 | 0011000(24) | 00419298 |
| 0000000 | 00100 | 00011 | 010 | rd=rs1<<rs2 | 00101 | 0011000(24) | 0041A298 |
| 0000000 | 00100 | 00011 | 011 | rd=rs1<rs2 | 00101 | 0011000(24) | 0041B298 |
| 0000000 | 00100 | 00011 | 100 | rd=rs1^rs2 | 00101 | 0011000(24) | 0041C298 |
| 0000000 | 00100 | 00011 | 100 | rd=rs1>>rs2 | 00101 | 0011000(24) | 0041D298 |
| 0000000 | 00100 | 00011 | 100 | rd= rs1|rs2 | 00101 | 0011000(24) | 0041E298 |
| 0000000 | 00100 | 00011 | 100 | rd=rs1&rs2 | 00101 | 0011000(24) | 0041F298 |

**Vector I-Type**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Imm  31:20 | rs1  19:15 | funct3  14:12 | Rd(description) | Rd value  11:7 | Op  6:0 | hex-code |
| 000001001101 | 00011 | 010 | LOAD rd = imm | 00101 | 0101100(44) | 04D1A2AC |
| 000001001101 | 00011 | 000 | rd=rs1 +signExt(imm) | 00101 | 0100111(39) | 04D182A7 |
| 000001001101 | 00011 | 001 | rd=rs1<<uimm | 00101 | 0100111(39) | 04D192A7 |
| 000001001101 | 00011 | 010 | rd=rs1 < SignExit(imm) | 00101 | 0100111(39) | 04D1A2A7 |
| 000001001101 | 00011 | 100 | rd=rs1 ^ SignExit(imm) | 00101 | 0100111(39) | 04D1C2A7 |
| 000001001101 | 00011 | 101 | rd=rs1 >> uimm | 00101 | 0100111(39) | 04D1D2A7 |
| 000001001101 | 00011 | 110 | rd=rs1 | signExt(imm) | 00101 | 0100111(39) | 04D1E2A7 |
| 000001001101 | 00011 | 111 | rd=rs1 & signExt(imm) | 00101 | 0100111(39) | 04D1F2A7 |