| Instruction | Instr type | RegWrite | ImmSrc 2:0 | ALUSrcA | ALUSrcB | ALUControl 2:0 | MemWrite 3:0 | ResultSrc 1:0 | branch | Jump | PCSrc | ALUop | JALR | Load type 2:0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LUI | U | 1 | 100 | X | X | XXX | 0000 | 11 | 0 | 0 | 0 | XX | 0 | 000 |
| AUIPC | U | 1 | 100 | 1 | 1 | ADD | 0000 | 00 | 0 | 0 | 0 | 00 | 0 | 000 |
| JAL | J | 1 | 011 | X | X | XXX | 0000 | 10 | 0 | 1 | 1 | XX | 0 | 000 |
| JALR | I | 1 | 000 | 0 | 1 | ADD | 0000 | 10 | 0 | X | X | 00 | 1 | 000 |
| BEQ | B | 0 | 010 | 0 | 0 | SUB | 0000 | XX | 1 | 0 | zero | 01 | 0 | XXX |
| BNE | B | 0 | 010 | 0 | 0 | SUB | 0000 | XX | 1 | 0 | !zero | 01 | 0 | XXX |
| BLT | B | 0 | 010 | 0 | 0 | SLT | 0000 | XX | 1 | 0 | negflag | 01 | 0 | XXX |
| BGE | B | 0 | 010 | 0 | 0 | SLT | 0000 | XX | 1 | 0 | !negflag | 01 | 0 | XXX |
| BLTU | B | 0 | 010 | 0 | 0 | SLTU | 0000 | XX | 1 | 0 | UnsignedLT | 01 | 0 | XXX |
| BGEU | B | 0 | 010 | 0 | 0 | SLTU | 0000 | XX | 1 | 0 | !UnsignedLT | 01 | 0 | XXX |
| LB | I | 1 | 000 | 0 | 1 | ADD | 0000 | 01 | 0 | 0 | 0 | 00 | 0 | 010 |
| LH | I | 1 | 000 | 0 | 1 | ADD | 0000 | 01 | 0 | 0 | 0 | 00 | 0 | 001 |
| LW | I | 1 | 000 | 0 | 1 | ADD | 0000 | 01 | 0 | 0 | 0 | 00 | 0 | 000 |
| LBU | I | 1 | 000 | 0 | 1 | ADD | 0000 | 01 | 0 | 0 | 0 | 00 | 0 | 100 |
| LHU | I | 1 | 000 | 0 | 1 | ADD | 0000 | 01 | 0 | 0 | 0 | 00 | 0 | 011 |
| SB | S | 0 | 001 | 0 | 1 | ADD | 0001 | XX | 0 | 0 | 0 | 00 | 0 | XXX |
| SH | S | 0 | 001 | 0 | 1 | ADD | 0011 | XX | 0 | 0 | 0 | 00 | 0 | XXX |
| SW | S | 0 | 001 | 0 | 1 | ADD | 1111 | XX | 0 | 0 | 0 | 00 | 0 | XXX |
| ADDI | I | 1 | 000 | 0 | 1 | ADD | 0000 | 00 | 0 | 0 | 0 | 10 | 0 | 000 |
| SLTI | I | 1 | 000 | 0 | 1 | SLT | 0000 | 00 | 0 | 0 | 0 | 10 | 0 | 000 |
| SLTIU | I | 1 | 000 | 0 | 1 | SLTU | 0000 | 00 | 0 | 0 | 0 | 10 | 0 | 000 |
| XORI | I | 1 | 000 | 0 | 1 | XOR | 0000 | 00 | 0 | 0 | 0 | 10 | 0 | 000 |
| ORI | I | 1 | 000 | 0 | 1 | OR | 0000 | 00 | 0 | 0 | 0 | 10 | 0 | 000 |
| ANDI | I | 1 | 000 | 0 | 1 | AND | 0000 | 00 | 0 | 0 | 0 | 10 | 0 | 000 |
| SLLI | I | 1 | 000 | 0 | 1 | SLL | 0000 | 00 | 0 | 0 | 0 | 10 | 0 | 000 |
| SRLI | I | 1 | 000 | 0 | 1 | SRL | 0000 | 00 | 0 | 0 | 0 | 10 | 0 | 000 |
| SRAI | I | 1 | 000 | 0 | 1 | SRA | 0000 | 00 | 0 | 0 | 0 | 10 | 0 | 000 |
| ADD | R | 1 | XXX | 0 | 0 | ADD | 0000 | 00 | 0 | 0 | 0 | 11 | 0 | 000 |
| SUB | R | 1 | XXX | 0 | 0 | SUB | 0000 | 00 | 0 | 0 | 0 | 11 | 0 | 000 |
| SLL | R | 1 | XXX | 0 | 0 | SLL | 0000 | 00 | 0 | 0 | 0 | 11 | 0 | 000 |
| SLT | R | 1 | XXX | 0 | 0 | SLT | 0000 | 00 | 0 | 0 | 0 | 11 | 0 | 000 |
| SLTU | R | 1 | XXX | 0 | 0 | SLTU | 0000 | 00 | 0 | 0 | 0 | 11 | 0 | 000 |
| XOR | R | 1 | XXX | 0 | 0 | XOR | 0000 | 00 | 0 | 0 | 0 | 11 | 0 | 000 |
| SRL | R | 1 | XXX | 0 | 0 | SRL | 0000 | 00 | 0 | 0 | 0 | 11 | 0 | 000 |
| SRA | R | 1 | XXX | 0 | 0 | SRA | 0000 | 00 | 0 | 0 | 0 | 11 | 0 | 000 |
| OR | R | 1 | XXX | 0 | 0 | OR | 0000 | 00 | 0 | 0 | 0 | 11 | 0 | 000 |
| AND | R | 1 | XXX | 0 | 0 | AND | 0000 | 00 | 0 | 0 | 0 | 11 | 0 | 000 |
| FENCE | R |  | XXX |  |  |  |  |  | notsure | notsure | notsure | 000 | 0 |  |
| ECALL | I |  | 000 |  |  |  |  |  | notsure | notsure | notsure | 001 | 0 |  |
| EBREAK | I |  | 000 |  |  |  |  |  | notsure | notsure | notsure | 001 | 0 |  |

| | |
|---|---|
| 1111-->SW | 00 --> Alu Result |
| 0001-->SB | 01 -->Memory Data |
| 0011-->SH | 10 --> PCPlus4 |
| | 11 -->LUI (immExt) |

| ALUop | funct3 | funct7 | ALU control | instruction | OPCODE |
|---|---|---|---|---|---|
| 00 | X | X | ADD | LB,LH,LW,LBU,LHU,SB,SH,SW,AUIPC,JALR | 0010111,1100111,0000011,0100011 |
| 01 | 000,001 | X | SUB | BEQ,BNE | 1100011 |
|  | 100,101 | X | SLT | BLT,BGE |  |
|  | 110,111 | X | SLTU | BLTU,BGEU |  |
| 10 | 000 | X | ADD | ADDI | 0010011 |
|  | 010 | X | SLT | SLTI |  |
|  | 011 | X | SLTU | SLTIU |  |
|  | 100 | X | XOR | XORI |  |
|  | 110 | X | OR | ORI |  |
|  | 111 | X | AND | ANDI |  |
|  | 001 | X | SLL | SLLI |  |
|  | 101 | 0000000 | SRL | SRLI |  |
|  | 101 | 0100000 | SRA | SRAI |  |
| 11 | 000 | 0000000 | ADD | ADD | 0110011 |
|  | 000 | 0100000 | SUB | SUB |  |
|  | 001 | X | SLL | SLL |  |
|  | 010 | X | SLT | SLT |  |
|  | 011 | X | SLTU | SLTU |  |
|  | 100 | X | XOR | XOR |  |
|  | 101 | 0000000 | SRL | SRL |  |
|  | 101 | 0100000 | SRA | SRA |  |
|  | 110 | X | OR | OR |  |
|  | 111 | X | AND | AND |  |