**AK MARK-03**

**INTRODUCTION:**

AK MARK-03 is the third iteration of a 32bit general purpose processor. The processor has 9 stages of pipelining. The processor has 256 bytes of instruction memory.

INSTRUCTIONS SUPPORTED:

INTIGER ARITHMATIC INSTRUCTIONS (REG to REG)

TYPE-1

|  |  |  |
| --- | --- | --- |
| INSTRUCTION | OPCODE | DISCRIPTION |
| Addition | add | Adds 2 registers and stores in a destination register. |
| Subtraction | sub | Subtracts 2 registers and stores in a destination register. |

FORMAT:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| OPCODE | DESTINATION REG |  | SOURCE REG 2 | SOURCE REG 1 |

31 26 25 22 21 8 7 4 3 0

TYPE-2

|  |  |  |
| --- | --- | --- |
| INSTRUCTION | OPCODE | DISCRIPTION |
| Multiplication | mul | multiplies 2 registers and stores the upper 32 bits in one register and the lower 32 bits in another register. |
| Division | div | divides 2 registers and stores the the result in destination register 1 and stores the remainder in destination reg 2. |

FORMAT:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| OPCODE | DESTINATION REG 1 | DESTINATION REG 2 |  | SOURCE REG 2 | SOURCE REG 1 |

31 26 25 22 21 18 17 8 7 4 3 0

INTIGER ARITHMATIC/MOVE Immediate INSTRUCTIONS (REG to immediate)

TYPE-1

|  |  |  |
| --- | --- | --- |
| INSTRUCTION | OPCODE | DISCRIPTION |
| Addition immediate(unsigned) | addi | Adds 1 registers with an immediate value and stores in a destination register. |
| Subtraction immediate(unsigned) | subi | Subtracts 2 registers and stores in a destination register. |
| Move | mov | Moves immediate value into the specified register |

FORMAT:

|  |  |  |
| --- | --- | --- |
| OPCODE | REG 1 | IMMEDIATE VALUE |

31 26 25 22 21 0

JUMP/BRANCH INSTRUCTIONS

|  |  |  |
| --- | --- | --- |
| INSTRUCTION | OPCODE | DISCRIPTION |
| jmp | addi | Jumps to the specified address location |
| Branch if not zero | subi | If the specified register is not zero then jumps to the specified location |

FORMAT:

|  |  |  |  |
| --- | --- | --- | --- |
| OPCODE | REG 1 |  | ADDRESS LOCATION |

31 26 25 22 21 5 0

MOVE INSTRUCTION

|  |  |  |
| --- | --- | --- |
| INSTRUCTION | OPCODE | DISCRIPTION |
| Move | mov | Moves data form REG1 to REG2 |

FORMAT:

|  |  |  |  |
| --- | --- | --- | --- |
| OPCODE |  | REG2 | REG 1 |

31 26 25 8 7 4 3 0