# BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
## K. K. BIRLA Goa Campus
### *Second Semester 2016-2017*
### Advanced Computer Architecture
### *Course Project*

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**Question #1**

Design Superscalar architecture with given instruction set

Instructions

| | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Load | LDRH | <Rd> | <Rn> | #<5_bit_offset> | | | | | | | | | | | | | Rd = zeroExtend(Mem[Rn + Offset *2]) |
| | 0 | 1 | 1 | 1 | 1 | Offset | | | | | Rn | | | Rd | | | |
| Store | STRH | <Rd> | <Rn> | #<5_bit_offset> | | | | | | | | | | | | | Mem[Rn+ Offset *2] = Rd[15:0] |
| | 0 | 1 | 1 | 1 | 0 | Offset | | | | | Rn | | | Rd | | | |
| Add | ADD | <Rd> | <Rn> | #<8_bit_imm> | | | | | | | | | | | | | Add Imm value to Rd and store the value in Rd |
| | 0 | 0 | 1 | 0 | 0 | Rd | | | Imm | | | | | | | | N, Z, C, V |
| Sub | SBC | <Rm> | <Rn> | | | | | | | | | | | | | | Rd = Rd – Rm – C |
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Rm | | | Rd | | | N, Z, C, V |
| Jump | B | <target address> | | | | | | | | | | | | | | | PC = PC + (signExt(offset)<<1) |
| | 1 | 1 | 1 | 0 | 0 | Offset | | | | | | | | | | | |
| Shift | ASR | <Rm> | <Rn> | | | | | | | | | | | | | | Rd = Rd (Arithmetic)>> Rm |
| | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Rm | | | Rd | | | N, Z, C |
| BIC | BIC | <Rm> | <Rn> | | | | | | | | | | | | | | Rd = Rd AND NOT Rm |
| | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Rm | | | Rd | | | N, Z |
| B | B | LE | #<8_bit_offset> | | | | | | | | | | | | | | if cond then PC = PC + (signExt(offset)<<1) |
| | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | Offset | | | | | | | | Cond. Is N flag |

| Exceptions(Arithmetic Overflow and Undefined Instruction) |
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