IIT Bhubaneswar
School of Electrical Sciences
COA Lab (0 - 0 - 3)
Autumn 2020

Lab Schedule: Thu (10AM -1PM **)**

Instructor: Debi Prosad Dogra (dpdogra@iitbbs.ac.in)

Teaching Assistant : Shivani and Rohit

Submission Deadline: 11-11-2020 (midnight)

Assignment 6 (Mini Project)

Points: 200

Name: Dushyanth

Roll No.:18CS01009

Encoding Scheme:

General Instruction Format: (32-bit)

31-30	29-26	25-21	20-16	15-11	10-0
Unused	op_code	Rd	S1	S2	Unused

(or)

31-30	29-26	25-21	20-16	15-0
Unused	op_code	Rd	S1	Immediate_value

Op_code: 4-bit

Rd: Destination Register(5-bit)

S1: 1st Source Register(5-bit)

S2: 2nd Source Register(5-bit)

Immediate_value: 16-bit

Instructions without Immediate and their format:

Instruction	31-30	29-26	25-21	20-16	15-11	11-0
	Unused	Op_code	Rd	S1	S2	Unused
MOVE R i , R j	00	1000	R i	00000	R j	All Zeros
ADD R_i, R_j, R_k	00	0000	R i	R j	R k	All Zeros
SUB R_i, R_j, R_k	00	0010	R i	R j	R k	All Zeros
AND R_i, R_j, R_k	00	0100	R i	R j	R k	All Zeros
OR R_i, R_j, R_k	00	0110	R i	R j	Rk	All Zeros
HLT	00	1100	00000	00000	00000	All Zeros

Note: I have used explicit zeros for encoding if specific part of the Instruction is not required

Ex: For HLT we do not require Ri, Rj, Rk hence the values are zeros.

Ri, Rj, Rk: 5-bit number that represents one of the 32 GPRs.

Instructions with Immediate and their format:

Instruction	31-30	29-26	25-21	20-16	15-0
	Unused	Op_code	Rd	S1	X
MOVE R_i, X	00	1001	Ri	0	X
LOAD R_i, X (R_j)	00	1010	Ri	Rj	X
STORE R_i,X (R_j)	00	1011	Rj	Ri	X
ADI R_i, R_j, X	00	0001	Ri	Rj	X
SUI R_i, R_j, X	00	0011	Ri	Rj	X
ANI R_i, R_j, X	00	0101	Ri	Rj	X
ORI R_i, R_j, X	00	0111	Ri	Rj	X

X: immediate value (16-bit)

Note: The encoding for STORE is different.

Rj is stored at 25-21 and Ri is stored at 20-16 so that the decoding becomes easy.

The 32-bit instruction is represented as Hexa-decimal number and is entered at suitable location in RAM.

EX: Store R4, 6(R1)

Encoding format: 00 op_code R1 R4 X i.e. 00 1011 00001 00100 0000000000000110

Entered into RAM as : 2c240006 (hexa-decimal equivalent)