

DESIGN  
FIFTH EDITION  
MK

Topic..

2. for  
of ea  
s  
↓  
Gavel

Tonic

Topic.....Date.....

Shreyas Bhat Kera  
2018A7PS1119P

Q1.	R1	3	2	5	6
51 pred	T	T	T	NT	NT
blact	NT	T	NT	T	
52 pred	T	T	T	T	
52 get	NT	NT	NT	NT	NT
53 pred	T	T	T	T	NT
blact	NT	NT	NT	NT	

Topic..

NAME: Shreyas Bhut Kera  
ID: 2018A7PS1119P

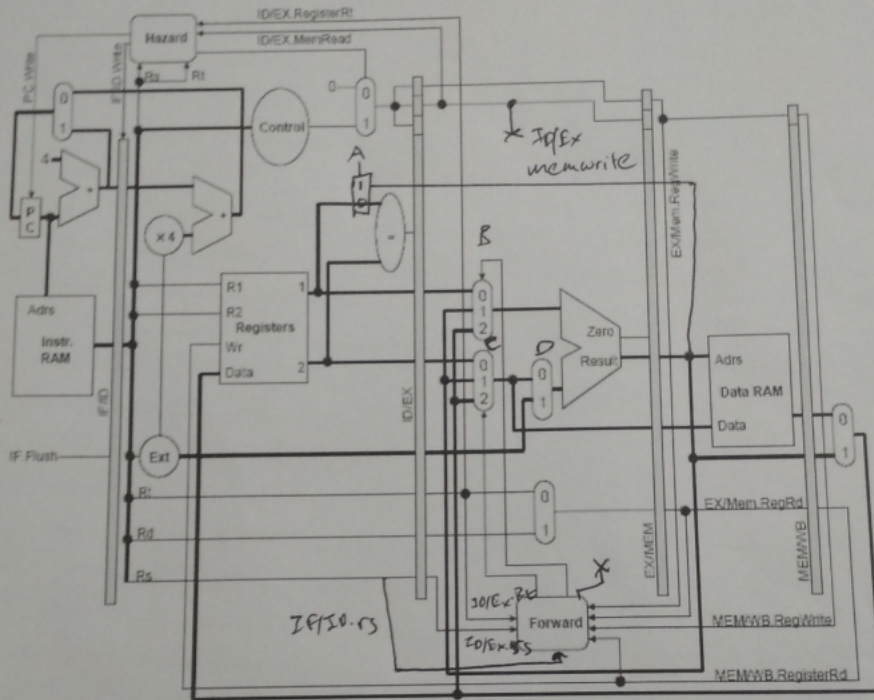
Answer:

BEd

sw

ADD

Q2)



EQUATIONS:

Forward = BEd

if (ID.opcode == BEd

and Ex/Mem.RegRd == IF/ID.Rs

and Ex/Mem.RegRd != 0

and Ex/Mem.RegWrite == 1)

then A = 1

Forward for sw

If (ID/EX.MemWrite == 1

and Ex/Mem.RegWrite == 1

and Ex/Mem.RegRd == ID/EX.Rs

and Ex/Mem.RegRd != 0)

then B = 1, D = 1

If (ID/EX.MemWrite == 1,

Ex/Mem.RegWrite == 1,

Ex/Mem.RegRd == ID/EX.Rt

Ex/Mem.RegRd != 0) then

C = 1, D = 1

Q3

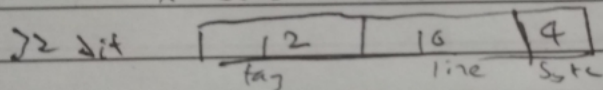
a) size = 1024 KB =  $2^{20}$  B  
4 word block =  $4 \times 4 = 16$  bytes =  $16 \times 8 = 128$  bits  
32 bit address

Direct mapped  $\rightarrow$  assume 1 bit for v/I

$$\text{No of lines} = 2^{20} / 16 = 2^{20-4} = 2^{16}$$

$\therefore$  16 bits needed to choose line

4 bits needed to choose byte



$$\begin{aligned}\text{total bits} &= (\text{tag} + \text{data} + \text{v/I}) \times 2^{16} \\ &= (12 + 128 + 1) \times 2^{16} \\ &= 9,240,576 \text{ bits}\end{aligned}$$

Teacher's Sign.....



Topic.....

Date.....

Shreyas Bhat Kera  
2018A7PS1119P

36) size =  $1\text{MB} = 2^{20}$  bytes

4 word block = 16 bytes = 128 bits

32 bit address

4-way

No. of lines =  $2^{20}/16 = 2^{20-4} = 2^{16}$

Since 4-way  $\rightarrow 2^{14}$

14	14	4
----	----	---

 16 bytes  $\Rightarrow$  4 bits to choose  
 tag                  set byte

$$\text{total} = (\text{tag} + \text{data} + \text{V/I}) \times 2^{16}$$

$$= (14 + 128 + 1) \times 2^{16}$$

$$= 9,371,648 \text{ bits}$$



Shreyas Bhat Kere  
2018A7P31119P

(Ans)	inst	cycles
	stg	4
	add	4
	lw	5
	add	4
	sw	4
	lui	4
	sub	4
	beqz	4

total 32 cycles for 8 instr

$$\therefore CPI = \frac{32}{8} = 4 \quad (\text{avg CPI}) \quad \frac{\text{cycles}}{\text{inst}}$$

$$\text{Clock rate} = 4 \text{ GHz} = 4 \times 10^9 \quad \frac{\text{cycles}}{\text{sec}}$$

$$MIPS = \frac{\text{millions of instr}}{\text{sec}} = \frac{\text{cycles}}{\text{sec}} \times \frac{\text{instr}}{\text{cycle}}$$

$$= \frac{4 \times 10^9}{4}$$

$$= 10^9 \text{ instr/sec}$$

$$= 10^3 \text{ million instr/sec}$$

$$MIPS = 1000 //$$



Date.....

Topic.....

Date.....

Shreyas Bhat Kar  
2018A7P5111AP

Q5 Dispatc<sup>n</sup> Rom 2

OP	name	value
10111	lsw	lsw2
10001	lw	lw2
10101	sw	sw2

Dispatc<sup>n</sup> rom 1

OP	name	val
...	...	...
10111	lsw	mem1

Inst	ALU	SRCC	JRCH	Key	Mem	Perwrite	Seq
...	...	...	...	...	...	...	...
lsw2	Add	Alwat	4		ReadALU		Seq
	<del>Read</del>			writeMR	writeALU		<del>Seq</del>

∴ indicates similar to original table