

01

SUNDAY - JANUARY

WK-53 • 001-364

JANUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31														

Appointments

Chapter-1

Q1) (C)

$$I_1 : H = 02H$$

$$I_2 : L = 05H$$

$$(loop) I_3 : L = 04(NZ) \quad | \quad L = 03(NZ) \quad | \quad L = 02(NZ)$$

$$I_4 : NZ(T) \quad | \quad NZ(T) \quad | \quad NZ(T) \quad |$$

1st 2nd 3rd

I5 :

I6 :

Q2) (a)

SUB & DEC Instructions are differ
in terms of carry flag only.
So zero flag behavior is same

Q3) (C)

02

JANUARY - MONDAY

002-363 • WK-01

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										

Appointments

2 2 2 2 2 2
7 7 7 7 7 7
L: 0 0 0 0 0 0

$$L: \overline{1+1+1+1} = 255$$

$$\begin{array}{l|l|l} L=01(NZ) & L=00(Z) & L=255(NZ) \\ \hline I_2: NZ(T) & NZ(False) & NZ(T) \\ \hline 4^{\text{th}} & & 1^{\text{st}} \\ & & \text{time} \\ & & 255 \\ & & L=00(Z) \\ & & \text{times} \\ & & \text{to transfer} \\ & & \text{control} \\ & & H=00(Z) \\ & & NZ(False) \end{array}$$

FEB

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03

TUESDAY - JANUARY

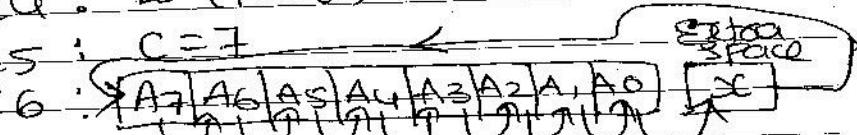
WK-01 • 003-362

JANUARY 2017

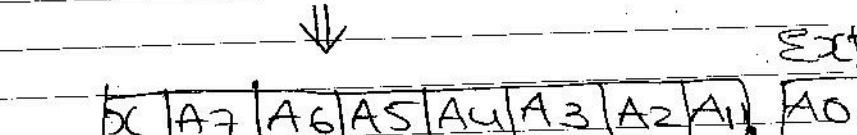
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	M	T	W	T	F	S	S	M	T	W	F	S	S	

Appointments

(Q4) (b)

I₁: B = 0I₂: C = 8I₃: 8 cmp 0 (NZ)I₄: Z (false)I₅: C = 7I₆: 

↓

I₇: I₈: If 0th bit value → 0 (NC); goto next iteration.I₉: In A-Reg → 1(C); Inc the B-RegI₁₀: then goto next iterationI₁₁: X:I₁₂:I₁₃:I₁₄:I₁₅: (a)

In this program segment, A-Reg Data

is scanned in bit-wise. After each

bit scanning B-Reg is incremented

when the bit value is 1. i.e. B-Reg

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	

Appointments

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04

JANUARY - WEDNESDAY

004-361 • WK-01

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THURSDAY - JANUARY

WK-01 • 005-360

JANUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	F	S

Appointments

Q6) (c)

Q7) (c)

Byte Addressable Storage

I1:	1000	-	1007
I2:	1008	-	1011
I3:	1012	-	1015
I4:	1016	-	1023
I5:	1024	-	1027
	1028		

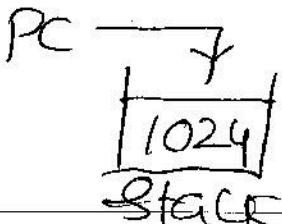
Valid-PC

FC Halt IR

PC: 1028

EC JMP 1024

PC: 1028 1024

INT
yes

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	

Appointments

Q8) (b)

Word Addressable Storage

I1:	1000	-	1001
I2:	1002		
I3:	1003		
I4:	1004	-	1005
I5:	1006		
	1007		

↓
Valid-PCFC Add r2, r3 {IR
PC: 1004}

r2 ← r2 + r3

EC

INT

yes
PC →
1004
Stack

06

JANUARY - FRIDAY

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SATURDAY - JANUARY

WK-01 • 007-358

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	F

Appointments

Q9) (b)

IF + ID	OF + PD + WB
I ₁ 2W x 2C	3C
I ₂ 1W x 2C	3C
I ₃ 1W x 2C	1C
I ₄ 2W x 2C	3C
I ₅ 1W x 2C	•
I _H C	I _O C

= 24 cycles

08

SUNDAY 008-357

Q10) (c)

Q11) (c)

Q12) (c)

Q13) (b)

Q14)

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	

Appointments

16 bit

[opcode] [Addr1] [Addr2]

2bit \log_{128} \log_{128}

2 2

↓ ↓

7bit 7bit

$$\#OP = 2^2 \\ = 4$$

Share the opcodes

I-Addr

O-Addr

① 1 — 3

② 3 — 1

Range of I-Addr Ins? = {1 to 3}

Range of O-Addr Ins? = {1*2⁷ to 3*2⁷}

= {128 to 384}

Q14) (c)

free opcodes = (4-2)

= 2

↳ #I-Addr Ins? Possible
 $\Rightarrow 2 * 2^7$
 $\Rightarrow 256$

09

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009-356 • WK-02

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10

TUESDAY - JANUARY

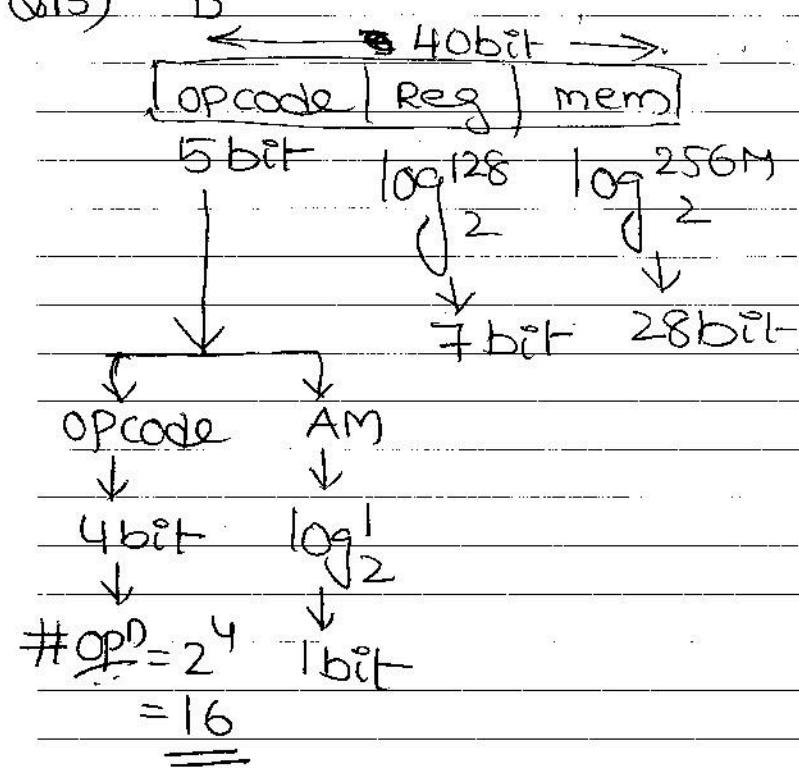
WK-02 • 010-355

JANUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31														

Appointments

Q15) b



Q16) b

} linked questions

{ 15, 16 & 17 }

Q17) b

~~Q18~~

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										

Appointments

Q18) (d)

$$I_1: R_s = 1$$

$$I_2: R_d = M[1000 + [R_s]] \\ = M[1001] \\ = 1$$

$$I_3: R_d = R_d + 1000 \\ R_d = 1001$$

$$I_4: M[0 + [R_d]] \leftarrow 20$$

$$M[1001] \leftarrow 20$$

Q19) (d)

Q20) (d)

Q21) (d)

Q22) (b)

Q23) (c)

Q24) (d)

$$\text{Reg file} = W(L+C) + G \\ = 304$$

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THURSDAY - JANUARY

WK-02 • 012-353

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31														

M T W T F S S M T W T F S S M T W T F S S

Appointments

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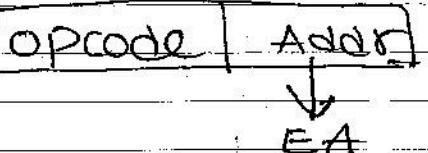
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										

M T W T F S S M T W T F S S M T W T F S S

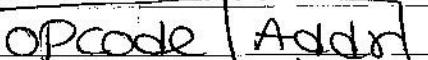
Appointments

Q25) (d)

Absolute Am:



Relative Am:



$$EA = PC + \text{relative value}$$

Q26) (a)

Q27) (d)

Q28) (C)

Q29)

Q30)

Q31)

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										

M T W T F S S M T W T F S S M T W T F S S

Appointments

Q29) 21

Operand Accessing reference.

I₁: 1MRI₂: 1MR }I₃: — }I₄: 1MR }I₅: — }I₆: — }I₇: — }I₈: — }

10 times

Q30) 100

M[2000] = 100110 }

M[2001] = 100109 }

M[2009] = 101

M[2010] = 100

only 10 mem cells
also affected, NO
change in [2010] cell.

Q31) 1024

Q32)

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SATURDAY - JANUARY

WK-02 • 014-351

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
M	T	W	T	F	S	S	M	T	F	S	S	M	T	F

Appointments

Q32) 6

IF	ID	OF	PD	WB
IMR	2MR	3MR	-	IMR

Fetch
cycle
(IMR)Exec. cycles
(6MR)

15

SUNDAY 015-350

Q33) 55232

16 bit

Opcode	Addr1	Addr2
8bit	4bit	4bit

$$\# \text{Op} = 2^8$$

$$= 256$$

$$\# \text{free opcodes} = (256 - 34)$$

$$= 222$$

Q34) #1-Addr Ins = 3552

free opcodes = 3452

0-Addr Ins = 55232

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JANUARY - MONDAY

016-349 • WK-03

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	F	S	S	M	T	F	S	S		

Appointments

Q34) 32

Q35) 342010

EA = PC + relative value

Q36) 480198

EA = [Base reg] + [Index reg] + relative value

Q37) 3

Q38) 3

Q39) 1.45 cycles.

Becoz. cycletime is not given,
we can't report the fetch rate.

Q40)

17

TUESDAY - JANUARY

WK-03 • 017-348

Chapter-2

(a)

bbs	deg	Pos	label
-----	-----	-----	-------

Eg: [bbs | deg | Pos | label]

$\text{XO} = F8H$

$\text{XO}: 1111 \underset{\downarrow}{(1)} 000$

\downarrow
1
 \downarrow

(Set) (Reset)

\downarrow True \downarrow False

PC: Seg Addr PC: Segf. Addr

2000

Alternate process:

$\text{Temp} \leftarrow \text{mask and Reg}$

if $\text{temp} \rightarrow$ zero (Reset) \rightarrow False
 \rightarrow nonzero (set) \rightarrow True

JANUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T

Appointments

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JANUARY - WEDNESDAY

018-347 • WK-03

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	

Appointments

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7654 3210

Eg: $\text{XO}: 1111 \underset{\downarrow}{(1)} 000$ ($\text{Pos} = 3$)

Mask: $0000 \underset{\downarrow}{(1)} 000$

Temp: $0000 \underset{\downarrow}{(1)} 000$ [$08H$]

\hookrightarrow Nonzero

\hookrightarrow True

- 1 To implement "bbs" using alternate process, in mask variable only the respective position bit is set to '1' & remaining bits are '0's.
- 2 AND op reads the corresponding bit value only.
- 3 \therefore eliminate the options where mask contain multiple '1's.

option (a) is correct.

Mask $\leftarrow 0x1 \ll \text{Pos}$ { consider 3 8-bit deg }
 \downarrow
 \downarrow with pos = 3

Mask $\leftarrow 0x00000001 \ll 3$
 \downarrow
 \downarrow \downarrow \downarrow

Mask $\leftarrow 0000 \underset{\downarrow}{(1)} 000$
 $7654 \underset{\downarrow}{(3)} 210$ ✓

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JANUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31														

Appointments

Q2) (b)

Q3) (d)

Q4) (b)

Req: Add DO_1, SI_1 RTL: $\text{DO} \leftarrow \text{DO} + \text{SI}$

H/W Design

MOP: T1: $\text{DO}_{\text{out}}, \text{SI}_{\text{in}}$ T2: $\text{SI}_{\text{out}}, \text{Tin}$

T3: +, ALUout, DOin

Q5) (b)

Ins: Call IN, Sob RTL: $\text{ON} \leftarrow \text{PC} + 1$
~~PC~~ $\leftarrow \text{MC}[\text{PC}]$

H/W Design

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										

Appointments

MOP: T1: PCout, SIin, MARin

T2: MARout, MBRin & SystemBus Inc, ALUout, Tnin & Local Bus

T3: MBRout, PCin

Q6) (c)

Ins: call IN, sub

RTL: $\text{IN} \leftarrow \text{PC} + 1$
 $\text{PC} \leftarrow \text{MC}[\text{PC}]$

H/W Design

MOP: T1: PCout, SIin

T2: DOout, MARin

T3: MARout, MBRin & Sys Bus Inc, ALUout, Tnin & Local Bus

T4: MBRout, PCin

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Q7) (d)

Q8) (b)

Q9) (b)

Q10) (c)

Q11) (d)

Q12) (a)

22

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Q13) (d)

Q14) (b)

CISC (CPI ≠ 1) $I_1 \Rightarrow IC$ $I_2 \Rightarrow IC$ $I_3 \Rightarrow 40C$

$$\text{ET}_{CISC} = 42C$$

JANUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31														

M T W T F S S M T W T F S S M T W T F S S

Appointments

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TUESDAY - JANUARY

WK-04 • 024-341

JANUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T

Appointments

Q22) 25

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	T	F	S

Appointments

Chapter - 3

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JANUARY - WEDNESDAY

025-340 • WK-04

Q23) 103

Q1) a

tp = max (stage Delay)

Q2) b

IF SD EX WB

I1	1	1	1	1
I2	1	1	3	1
I3	1	1	1	1

Operand
Forwarding

	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8
I1	IF	SD	EX	WB				
I2	IF	SD	EX	EX	EX	WB		
I3	IF	SD	///	///	EX	WB		

Q5

Q5

26

THURSDAY - JANUARY

WK-04 • 026-339

JANUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T

Appointments

Q3) (d)

Q4) (d)

Q5) (a)

• It is a RISC Pipeline So operand forwarding is default

Q6) (a)

Q7) (d) without modification, no resegment & NOP substitution

Q8) (d)

with loop level 11SM : ~~25~~ cycles.

without loop level 11SM : ~~25~~ 15
⇒ 30 cycles.

Q5

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	

Appointments

Q9) (b)

- Q10) (b)
- IT is not a RISC Pipeline.
 - In this pipeline all instructions all proceed through all stages
 - ∴ Target Address is available at the end of last stage.

Q11) (a)

Q12) (b)

Q13) (c)

Q14) (a)

Q15) (c)

Q16) (d)

Q17) (b)

Q18) (b)

Q5

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SATURDAY - JANUARY

WK-04 • 028-337

JANUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

M T W T F S S M T W T F S S M T W T F S S

Appointments

Q19) (C)

Q20) (A)

Q21) (A)

Q22) (C)

Q23) (B)

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Q24) (B)

Q25) (B)

Q26) (C)

Q27) (D)

Q28) (B)

✓

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										

M T W T F S S M T W T F S S M T W T F S S

Appointments

Q29) 55.55

5 stage
PipelineOther
Installs
Optimized~~TOC~~ (Branch)
Installs
NOT optimized

NO stalls

(5-1) = 4 stalls

Prog

Others

80%

20% Branch

0 stalls

4 stalls

$$\therefore \frac{\# \text{stalls}}{\text{Prog}} = 0.2 * 4 \\ = 0.8$$

Aug Inst ET = $(1 + \frac{\# \text{stalls}}{\text{Prog}}) \text{cycle time}$
 $= (1 + 0.8) 10 \text{ng}$
 $= 18 \text{ng}$

30

JANUARY - MONDAY

030-335 • WK-05

FEB

MAR

APR

MAY

JUN

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TUESDAY - JANUARY

WK-05 • 031-334

JANUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T

Appointments

1 Ins? → 18 ns

? #Ins? ← 1 sec.

⇒ 1 Ins?
18 ns

⇒ 55.55 MIPS

Q30) 165.49

$$\boxed{ET_{\text{pipe}} = (k+n-1)t_p}$$

Q31) 1.4

Q32) 4.76

$$\begin{aligned} ET_{\text{pipe}} &= (k+n-1)t_p \\ &= (6+100-1)10ns \\ &= 1050ns \quad \cdot S = \frac{ET_{\text{nonpipe}}}{ET_{\text{pipe}}} \\ ET_{\text{nonpipe}} &= n t_n \\ &= 100 * 50 \\ &= 5000ns \quad \cdot S = 4.76 \end{aligned}$$

ACTION PLAN

FEBRUARY

WK	MON	TUE	WED	THU	FRI	SAT	SUN
5			1	2	3	4	5
6	6	7	8	9	10	11	12
7	13	14	15	16	17	18	19
8	20	21	22	23	24	25	26
9	27	28					

M	T	W	T	F	S	S
1	2	3	4	5		
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

" THERE IS A LOT OF SPACE AT TOP,
BUT THERE IS NO ROOM TO SIT DOWN "

THE MOMENT YOU ARE READY TO QUIT IS USUALLY THE
MOMENT RIGHT BEFORE THE MIRACLE HAPPENS. DON'T GIVE UP!

01

WEDNESDAY - FEBRUARY

WK-05 • 032-333

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
20	21	22	23	24	25	26	27	28												
M	T	W	T	F	S	S	M	T	F	S	S	M	T	F	S	S	M	T	F	S

Appointments

Q33) 44

Q34) 2.27

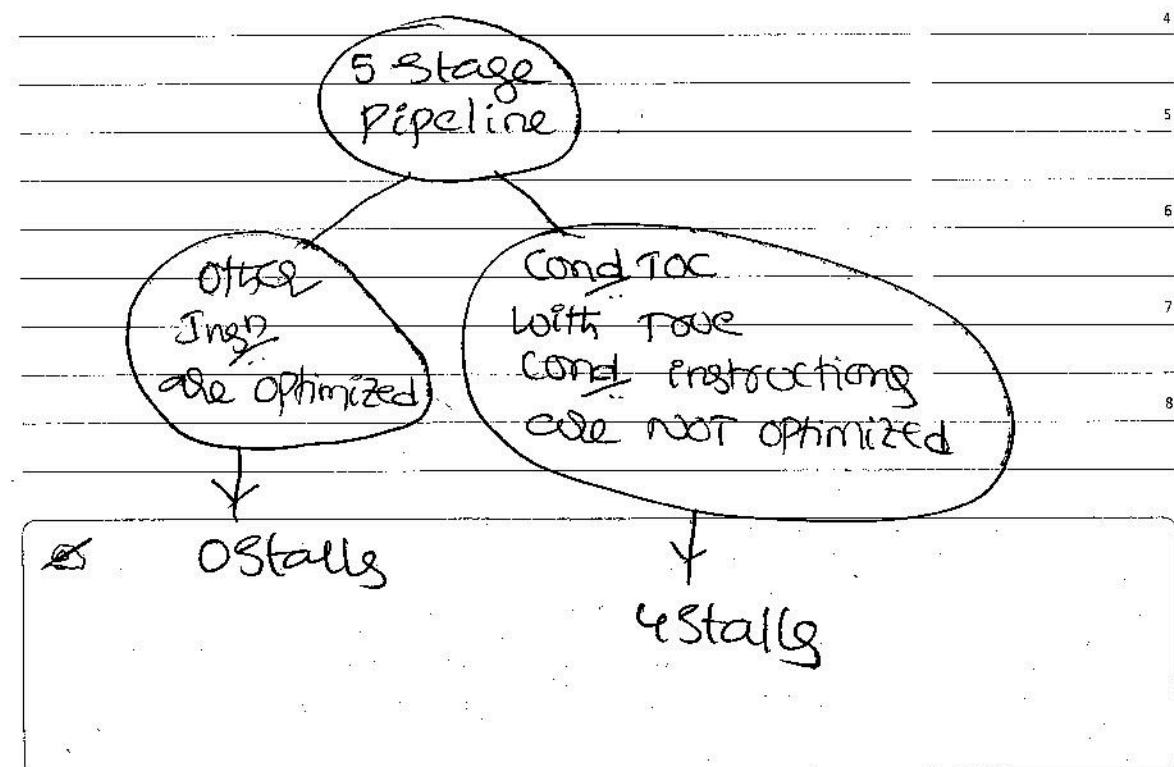
Q35) 38.96

Q36) 13

Q37) 15

Q38) 5.2

This question is discussed in the class notes.



02

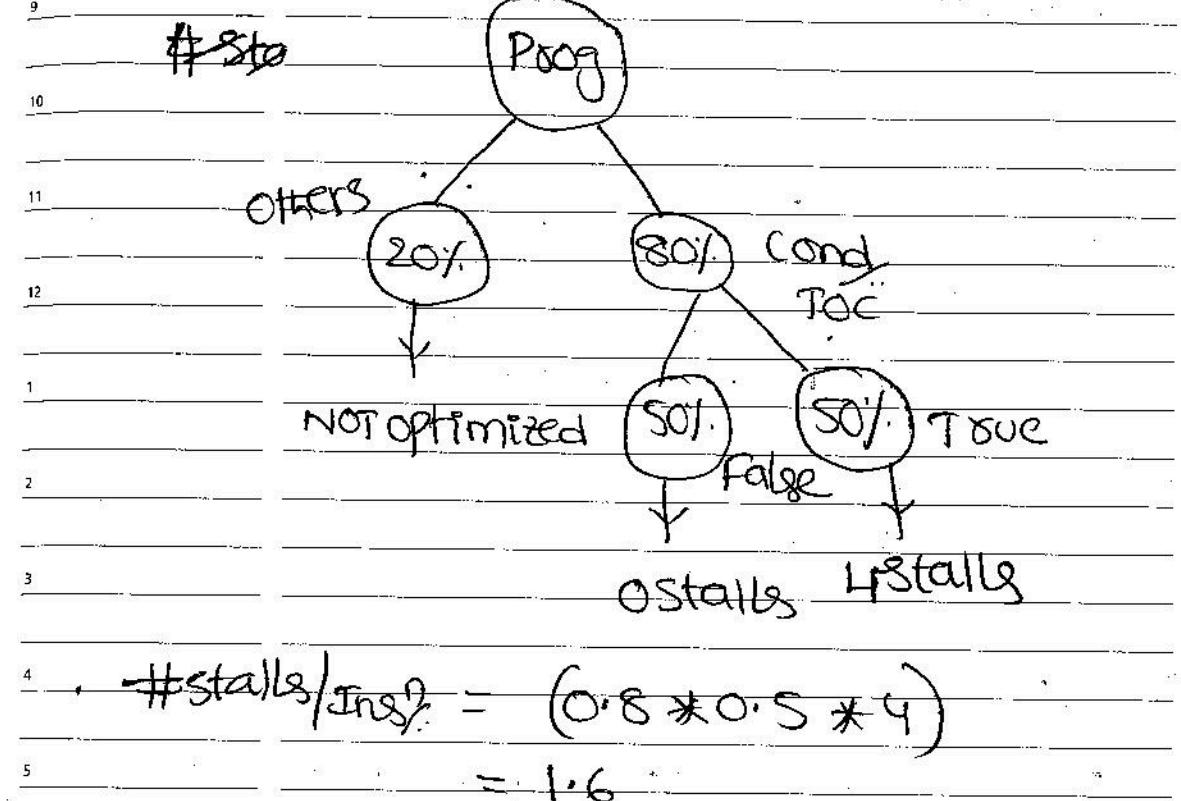
FEBRUARY - THURSDAY

033-332 • WK-05

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
20	21	22	23	24	25	26	27	28	29	30	31									
M	T	W	T	F	S	S	M	T	F	S	S	M	T	F	S	S	M	T	F	S

Appointments



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FRIDAY - FEBRUARY

WK-05 • 034-331

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	S

Appointments

Chapter-4

(Q1) (C)

$$\text{Overall} = \left[(1-F) + \frac{F}{S} \right]^{-1}$$

$$= \left[(1-0.7) + \frac{0.7}{10} \right]^{-1}$$

$$= 2.7$$

(Q2) (b)

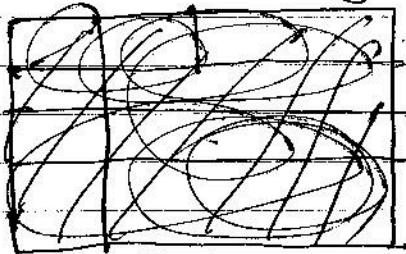
Direct CM

0	80
1	
2	
3	11
4	
5	
6	14
7	

0-m; 0 mod 8 = 0
 3-m; 3 mod 8 = 3
 14-m; 14 mod 8 = 6
 11-m; 11 mod 8 = 3
 4-m; 4 mod 8 = 4
 11-Hit

2-way Set Assoc CM

$$\# \text{sets} = \frac{n}{\text{P-way}} \Rightarrow \frac{8}{2} \Rightarrow 4$$



0	8	X	0
1			
2	14		
3	3	11	{LRU}

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	

Appointments

SET ASSOC CM FEBRUARY - SATURDAY

035-330 • WK-05

0-m; 0 mod 4 = 0

3-m; 3 mod 4 = 3

14-m; 14 mod 4 = 2

11-m; 11 mod 4 = 3

4-m; 4 mod 4 = 0

11-Hit

8-m; 8 mod 4 = 0

0-m; 0 mod 4 = 0

Miss penalty = 10 cycles

Total penalty = ~~8*~~ 7*1005
035-339 SUNDAY

(Q3) (C)

(Q4) (C)

(Q5) (C)

(Q6) (C)

04

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MONDAY - FEBRUARY

WK-06 • 037-328

FEBRUARY 2017

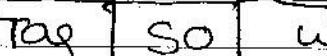
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F

Appointments

Q7) (c)

 $\leftarrow 32\text{bit} \rightarrow$ 17bit CacheIndex
15bit

Q8) (a)

 $\leftarrow 32\text{-bit} \rightarrow$ 

18bit 9bit 5bit

↓
Comparator $\frac{K}{10}$ ns

0.6

↓
Data Access $h_1 = 2 \cdot 4 \text{ns}$

☒

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F

Appointments

Q9) (d)

 $\leftarrow 32\text{bit} \rightarrow$ 

17bit 10bit 5bit

↓

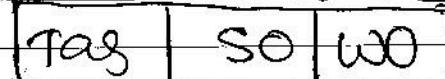
(Comparator) $\frac{K}{10}$ ns

↓

DataAccess

$$h_2 = 1 \cdot 7 \text{ns}$$

Q10) (d)

 $\leftarrow 20\text{bit} \rightarrow$ 9bit $\log_2 5$ 10bit $\log_2 64$

↓

5bit 6bit

☒

07

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038-327 • WK-06

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WEDNESDAY - FEBRUARY

WK-06 • 039-326

Q11) (b)

Q12) (d)

$$\cdot \# \text{lines} = \frac{64K}{16} \Rightarrow 2^{12}$$

$$\cdot \# \text{sets} = \frac{2^{12}}{2} \Rightarrow 2^{11}$$

• 32 bit

tag	so	wo
-----	----	----

$$17 \text{ bit } \log_2 2^{11} \quad \log_2 16 = 4 \text{ bit}$$

↓
11 bit

$$\cdot \text{Tagmem size} = S \times P \times \# \text{tag bits}$$

$$= 2^{11} \times 2 \times 17 \text{ bits}$$

$$= 68K \text{ bits}$$

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	S

Appointments

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	S

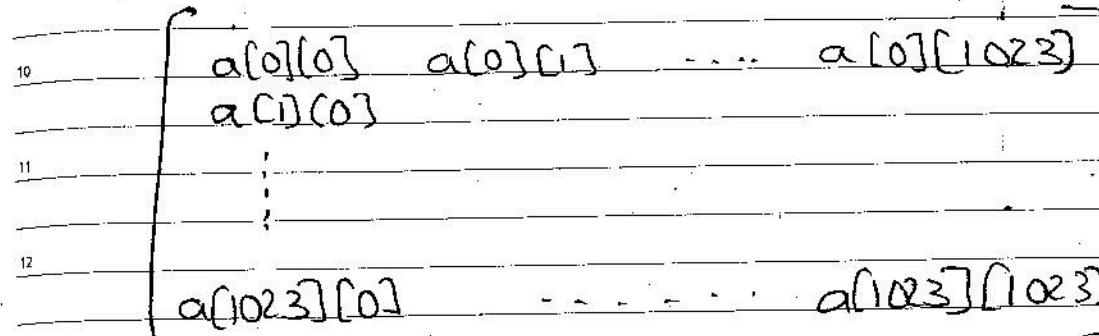
Appointments

FEBRUARY - THURSDAY

040-325 • WK-06

09

Q13) (b)



• one element size = 8B

• one block size = 16B

$$\therefore \# \text{elements/block} = \frac{16}{8} = 2$$

• One row contain 1024 elements

$$\therefore \# \text{blocks/row} = \frac{1024}{2} = 512$$

$$= 512$$

To carry one row, 512 blocks are required. So arrange the cache memory accordingly.

i.e. 2^{11} sets grouped into 4 (S12) parts.

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FRIDAY - FEBRUARY

WK-06 • 041-324

FEBRUARY 2017

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F

2-way set Assoc CM
[wo] o [wo] i

[50]0	$a[0][0]$ $a[0][1]$	$a[4][0]$ $a[4][1]$
1	$a[0][2]$ $a[0][3]$	$a[4][2]$ $a[4][3]$
:	:	:
511	$a[0][1023]$	$a[4][1023]$
512	1^{st} row	5^{th} row
1023		
1024	2^{nd} row	
1535		
1536	3^{rd} row	
2047		

$a[0][0]$ Index is $s_0 = 0$
 $w_0 = 0$

$a[4][0]$ Index is also same

~~s~~ i.e. ~~or~~ $s_0 = 0$
 $w_0 = 0$

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S

Appointmen

10. Row-wise Accessing

$a[0][0], a[0][1], a[0][2], \dots$

$a[0][0] = \text{miss}; a[0][0] a[0][1] \Rightarrow CM$

$\text{al}[\text{o}]\text{C}_1\text{J}$ - $\text{Hf}^{\circ}\text{H}$

`a[0][2] = miss; a[0][2] a[0][3] ⇒ cm`

$a[0][3] = \text{Hit}$

12

043-322 SUNDAY

So, it follows miss

$$\therefore \text{Hit ratio} = 50\%$$

1

三

1

3

13

MONDAY - FEBRUARY

WK-07 • 044-321

FEBRUARY 2017

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	20	21	22	23	24	25	26	27	28									
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F

Q15) (c) Correct Answer : 0.875

Q16) (b)

Q17) (a)

Q18) (d)

1.5 MR 1 Ingr.
1000 MR ? # Ingr.

$$\frac{\# \text{Ins}2}{\# \text{SMR}} = \frac{1000 \text{MR}}{1.5 \text{MR}} = 667$$

Avg mem. stalls_{final} = 8

$$\text{misses}_{L_1}/\text{ins} * \cancel{\text{hit time}_{L_2}} + (\text{misses}_{L_2}/\text{ins} * \text{misspend}_{L_2})$$

MARCH 201

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
20	21	22	23	24	25	26	27	28	29	30	31								
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S

Appointme

$$\Rightarrow \left(\frac{40}{667} * 10 \right) + \left(\frac{20}{667} * 100 \right)$$

\Rightarrow 3.6 cycles

Q19) C

$$\text{Total time} = \frac{\text{Access time}}{\text{Transfer time}} + \frac{\text{Transfer time}}{\text{Access time}}$$

$$= 32\text{ng} + \begin{cases} 16\text{B} = 18\text{ec} \\ 64\text{B} = ? \end{cases}$$

$$= 32n^3 + 64n^2$$

$$= 96 \text{ ne}$$

4

FEBRUARY - TUESDAY

045-320 • WK-07

1

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WEDNESDAY - FEBRUARY

WK-07 • 046-319

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	T	F	S

Appointments

Q20) (d)

$$L_2 - L_1 (4w)$$

$$L_2 - L_1 (4w)$$

$$L_2 - L_1 (4w)$$

$$L_2 - L_1 (4w)$$

$$(4 * L_2) + (4 * L_1) = 88w$$

Q21) (d)

$$L_2 \text{ Block Size} = MM \text{ Block Size}$$

$$MM - L_2$$

$$MM - L_2$$

$$MM - L_2$$

$$MM - L_2$$

$$L_2 - L_1$$

$$L_2 - L_1$$

$$L_2 - L_1$$

$$L_2 - L_1$$

$$(1 * MM) + (8 * L_2) + (4 * L_1) = 96w$$

e

16

FEBRUARY - THURSDAY

047-318 • WK-07

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	T	F	S

Appointments

Q22) (d)

Q23) (C)

Q24) (C)

Q25) (a)

16bit
[tag | 10 | w0]

$$2\text{bit } \log_2 12 \quad \log_2 3^2 = 5\text{bit}$$

↓
9bit

OXFBFC : [1111 1011 1111 1100]

Tag [1 D0 F] w0

Q26) (b)

Tag | So | w0

$$5\text{bit } \log_2 6 \quad 5\text{bit}$$

↓
6bit

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FRIDAY - FEBRUARY

WK-07 • 048-317

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	S

Appointments

ox FBFC :

1	1	1	1	0	1	1	1	1	1	0	0
tag	So	Wo									
	[1]	f									

Q27) (b)

Q28) (b)

Q29) (b)

Q30) (c)

Q31) (b)

Q32) (a)

Q33) (b)

Q34) (a)



MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	S

Appointments

- $H_x = 0.8$
- $H_w = 0.9$ ($H_w \neq 1$; So hierarchical Mem)
- Block size = 2 words
- $T_C = 20 \text{ ns}/\text{word}$

$$\begin{aligned} T_m &= 100 \text{ ns}/\text{word} \\ &= 200 \text{ ns}/\text{block} \end{aligned}$$

$$\begin{aligned} T_W [\text{Simultaneous write}] &= \max \left[\frac{\text{Access time}}{\text{in cm}}, \frac{\text{Access time}}{\text{in MM}} \right] \\ &= \max [20, 100] \\ &= 100 \text{ ns} \end{aligned}$$

$$\begin{aligned} f_R &= 70\% \quad (\because \text{Clean bits}) \\ f_W &= 30\% \quad (\because \text{Dirty bits}) \end{aligned}$$

Write Through

050-315 SUNDAY

MAR

19

$$T_{avg, \text{read}} = H_x T_C + (1-H_x) (T_m + T_C)$$

$$T_{avg, \text{write}} = H_w T_W + (1-H_w) (T_m + T_W)$$

$$T_{avg, \text{WT}} = (f_R * T_{avg, \text{read}}) + (f_W * T_{avg, \text{write}})$$

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MONDAY - FEBRUARY

WK-08 • 051-314

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	S

Appointments

Write Back

$$Tag_{read} = HwTc + (1-Hw) \left[\frac{1}{bits} \text{dirty} (Tm + Tm + Tc) + \frac{1}{bits} \text{clean} (Tm + Tc) \right]$$

=

$$Tag_{write} = HwTc + (1-Hw) \left[\frac{1}{bits} \text{dirty} (Tm + Tm + Tc) + \frac{1}{bits} \text{clean} (Tm + Tc) \right]$$

=

$$Tag_{WB} = (f_r * Tag_{read}) + (f_w * Tag_{write})$$

=

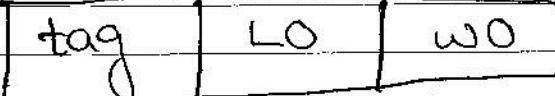
MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	S

Appointments

Q35) 5376

$$\cdot \# \text{lines} = \frac{8K}{32} \Rightarrow \frac{2^3}{2^5} \Rightarrow 2$$



$$\begin{aligned} & \cdot 19 \text{ bit } \log_2 8 \\ & \downarrow \quad \downarrow \\ & 8 \text{ bit } \end{aligned}$$

$$\begin{aligned} \cdot \text{Tag mem. size} &= \# \text{lines} * \# \text{tag bits} \\ &\text{in cm. in the line} \\ &= 2^8 * (19 \text{ bit} + 1 \text{ bit} + 1 \text{ bit}) \\ &= 256 * 21 \text{ bits} \\ &= 5376 \text{ bits} \end{aligned}$$

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FEBRUARY - TUESDAY

052-313 • WK-08

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WEDNESDAY - FEBRUARY

WK-08 • 053-312

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	T	F	S

Appointments

Q36: 20000 ns

Q37: 0.53

$\text{Hold} = 0.7$

TC : CM Access Time

Tm : MM Access Time

$$S = \frac{T_m}{T_C}$$

$$q = \frac{T_m}{T_C}$$

$T_m = 9T_C$

$T_{avg\ old} = 80 \text{ ns}$

$T_{avg\ new} = 80 \text{ ns} + (40\% * 80 \text{ ns})$

~~= 112 ns~~

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FEBRUARY - THURSDAY

054-311 • WK-08

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	

Appointments

$$T_{avg\ old} = H_C T_C + (1-H_C)(T_m + T_C)$$

$$80 = 0.7 T_C + (1-0.7)(9 T_C + T_C)$$

$$T_C = 21.62 \text{ ns}$$

$$\therefore T_m = 9 * T_C$$

$$= 194.59$$

Substitute the above Data,

$$T_{avg\ new} = H_C T_C + (1-H_C)(T_m + T_C)$$

$$112 = (H_C * 21.62) + (1-H_C)(194.59 + 21.62)$$

$$H_C = 0.53$$

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FRIDAY - FEBRUARY

WK-08 • 055-310

FEBRUARY 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F

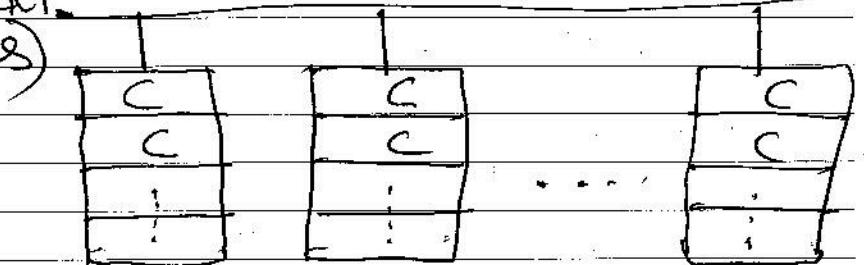
Appointments

Q38) 184

• CM Block size = 64B

• MM organization,

Decoder

 $(\frac{K \text{ ns}}{2})$ 

80ns 80ns 80ns

Bank-1 Bank-2

Bank-K

• One iteration

Accesses \Rightarrow KC Bytes

$$\Rightarrow 24 \times 2B$$

$$\Rightarrow 48B$$

• One iteration time

$$\Rightarrow \left(\frac{K \text{ ns}}{2} + 80 \text{ ns} \right)$$

$$\Rightarrow \left(\frac{24}{2} + 80 \right)$$

$$\Rightarrow 92 \text{ ns}$$

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FEBRUARY - SATURDAY

056-309 • WK-08

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	T	F	S

Appointments

- To access the complete cache block (64B), two iterations are required.

$$\therefore \text{Total time} = 2 * 92 \text{ ns}$$

$$= 184 \text{ ns}$$

Q39) 16384

• Direct cache

• CM size = 32KB

• Block size = 128B

$$\cdot \# \text{lines} = \frac{32 \text{ K}}{128} \Rightarrow \frac{2^15}{2^7} \Rightarrow 2^8 (256)$$

• Array element size = 8B

• Block size = 128B

$$\therefore \# \text{elements/block} = \frac{128}{8} \Rightarrow 16$$

• Row size = 512 elements

$$\therefore \# \text{blocks/row} = \frac{512}{16} \Rightarrow 32$$

$\{ \# \text{miss/row} \}$

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057-308 SUNDAY

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MONDAY - FEBRUARY

WK-09 • 058-307

FEBRUARY 2017																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28										
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	

Appointments

- In the memory array elements are always stored in a Rowwise format
- To access the elements in a Row major index one element miss we need to transfer one block of data i.e. 16 Element Block.

~~eg:~~ $a[0][0]$: Miss; $a[0][0] a[0][1] \dots a[0][15] \Rightarrow CM$

So, remaining 15 elements become hit.

$\therefore \# \text{Blocks/row} = \# \text{miss/row}$ (Spatial Locality)

So total # miss opn/Array

$$\Rightarrow \# \text{rows} * \# \text{miss/row}$$

in array

$$\Rightarrow 512 * 32$$

$$\Rightarrow 16384 (\text{mi})$$

~~eg~~

28

FEBRUARY - TUESDAY

059-306 • WK-09

MARCH 2017

MARCH 2017																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	

Appointments

QH0) 0.0625

~~10~~ 11. In the memory array is always stored in Row-wise

~~12~~ 13. When the elements are accessed in col-major index then every element is miss. BECAZ, NO spatial locality.

~~14~~ 15. Here, one col contain 512 elements so 512 Blocks are required to access One col. But 256 lines are present in the cache. So replacement will be take place in cache

~~16~~ 17. Every element in the ~~array~~ array is miss.

$$\therefore \# \text{miss/col} = 512$$

$$\therefore \text{Total } \# \text{miss/array} = 512 \text{ cols} * 512 \text{ miss/col}$$

$$= 262144 (\text{M2})$$

~~18~~

$$M1/M2 = 0.0625$$

MAR

APR

MAY

JUN

01

WEDNESDAY - MARCH

WK-09 • 060-305

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							

M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	T	F	S
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Appointments

SHI: 56

- #lines = 32
- Block size = 64 B
- MM size = 2^{16} B
- Addr size = 16bit
- Array size = 50×50 Bytes
= 2500 B

$$\therefore \# \text{blocks}/\text{array} = \frac{2500}{64} \Rightarrow 39.04 \Rightarrow 40$$

[B0 - B39]

16bit

Addr format:

Tag	LO	WO
-----	----	----

$$5 \text{bit} \log_2 32 \quad \log_2 64 = 6 \text{bit}$$

↓

5bit

1100H \Rightarrow

0001	0001	0000	0000
------	------	------	------

Tag LO WO

↳ line

number = 4

So, first Block(B0) is mapped into line "H"

ACTION PLAN

MARCH

03

	M	T	W	T	F	S	S
APRIL 2017	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30

WK	MON	TUE	WED	THU	FRI	SAT	SUN
9			1	2	3	4	5
10	6	7	8	9	10	11	12
11	13	14	15	16	17	18	19
12	20	21	22	23	24	25	26
13	27	28	29	30	31		

"A RAY OF AN IDEA, LEADS TO
A SPECTRUM OF OPPORTUNITIES"

ONE CAN NEVER ATTAIN PEACE IN THE
OUTER WORLD UNTIL WE MAKE PEACE WITH OURSELVES.

02

THURSDAY - MARCH

WK-09 • 061-304

Direct

CM

	Appointments			
1				
2				
3	B31			
4	B0	B32	B0(M)	B32(m)
5	B1	B33	B1(M)	B33(m)
6	B2	B34	B2(M)	B34(m)
7	B3	B35	B3(M)	B35(m)
8	B4	B36	B4(M)	B36(m)
9	B5	B37	B5(M)	B37(m)
10	B6	B38	B6(M)	B38(m)
11	B7	B39	B7(M)	B39(m)
12	B8		B8(HIT)	
13	B9		B9(HIT)	
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				

1st time = 10 Misses 2nd time = 16 Misses

Access Access

Q5

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	F	S	S	M	T	W	T	F	S	S

APRIL 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
17	18	19	20	21	22	23	24	25	26	27	28	29	30				
M	T	W	T	F	S	S	M	T	F	S	S	M	T	W	T	F	S

Appointments

Q42) 4 to 11

Q43) 64

Q44) ~~29~~ 29.62

$$\cdot T_m = 100 \text{ ns}$$

$$\cdot S = \frac{T_m}{T_C}$$

$$\cdot 10 = \frac{100}{T_C}$$

$$\cdot T_C = 10 \text{ ns}$$

WT Protocol

$$\cdot H_\sigma = 0.92 \quad f_\sigma = 85\gamma, \quad f_{\omega} = 15\gamma.$$

• H_ω = not given $\Sigma_{SO, mem, 3}$
 $\Sigma_{SO, considered as 1}$ $\Sigma_{IS, simultaneous}$
 $\Sigma_{organization}$

$$\begin{aligned} T_{avg\sigma} &= H_\sigma T_C + (1-H_\sigma) T_m \\ &= (0.92 * 10) + (1-0.92) 100 \\ &= 9.2 + 8 \\ &= 17.2 \text{ ns.} \end{aligned}$$

Q5

$$\begin{aligned} T_{avg\omega} &= H_\omega T_m \\ &= 100 \text{ ns} \end{aligned}$$

APR

MAX

JUN

04

SATURDAY - MARCH

WK-09 • 063-302

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F

Appointments

$$\begin{aligned}
 T_{avg_{WT}} &= (f_x * T_{avg_x}) + (f_w * T_{avg_w}) \\
 &= (85\% * 17.2 \text{ ns}) + (15\% * 100 \text{ ns}) \\
 &= 14.62 + 15 \\
 \Rightarrow T_{avg_{WT}} &= \underline{\underline{29.62}}
 \end{aligned}$$

05

SUNDAY 064-301

06

MARCH - MONDAY

065-300 • WK-10

APRIL 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
17	18	19	20	21	22	23	24	25	26	27	28	29	30				
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	F

Appointments

Chapter - 5

Q1) (a)

$x = 200 \text{ ns}$

$y = 50 \text{ ns}$

$$\frac{Y_{CPU} \text{ time}}{\text{Blocked}} = \left(\frac{Y}{X+Y} \right) 100$$

$= 20$

Q2) (b)

min time for I_3 : Only one INT at a time
 & without simultaneous occurrence

i.e I_3  $(4.5 \mu\text{sec}) (20 \mu\text{sec})$ $24.5 \mu\text{sec}$

APR

MAY

JUN

07

TUESDAY - MARCH

WK-10 • 066-299

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	F	S	S	M	T	W	F	S	S	

Appointments

max time req for I_i
 w/ simultaneous occurrence }

i.e. (I_1, I_2, I_3, I_4)



$\Rightarrow 93.5 \text{ usec}$

Range: {24.5 to 93.5}

Q3) (d)

Q4) (b)

$$\underline{x} : 1MB \rightarrow 1\text{sec}$$

$$1GB \rightarrow ?$$

$$\Rightarrow 16 \text{ usec}$$

$$\underline{y} : 4 \text{ usec}$$

~~x~~ time CPU = $\left(\frac{y}{x+y}\right) 100$

~~x~~ & blocked = 20

APRIL 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
17	18	19	20	21	22	23	24	25	26	27	28	29	30				
M	T	W	T	F	S	S	M	T	F	S	S	M	T	W	F	S	S

Appointments

Q5) (a)

Q6) (b)

Q7) (a)

$$1^{\text{st}} \text{CPU} : z(1-z)(1-z) \dots (n-1)$$

$$: z(1-z)^{n-1}$$

$$2^{\text{nd}} \text{CPU} : z(1-z)^{n-1}$$

$$n\text{-CPU}'s : n z(1-z)^{n-1}$$

Q8) (a)

Execution O/P

Prog: 1

2

3

4

5

6: x(new)

7: x(i/p)

8: x(i/p)

9: x(new)

10: x(i/p)

11: x(new)

12: x(new)

13:

14:

15: x(i/p)

16: x(i/p)

17: x(i/p)

18: ... 25

Reg1 Reg2

6: (x) A

8 B

9: (x) C

10 D

12: (x) E

14 F

16 G

08

MARCH - WEDNESDAY

067-298 • WK-10

APR

MAY

JUN

09

THURSDAY - MARCH

WK-10 • 068-297

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	S

Appointments

Q9) (C)

A15-AKAHA9A8 A7- A4A3- A0

7CA4 : 0111 1100 1010 0100

NOT connected

00 (C)

01 (D)

10 (E)

11 (F)

Q10) (C)

Q11) (C)

Q12) (a)

Q13) (a)

Q14) (b)

Q15) (d)

Q16) (C)

APRIL 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
17	18	19	20	21	22	23	24	25	26	27	28	29	30				
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S

Appointments

10

MARCH - FRIDAY

069-296 • WK-10

Q17) (d)

Q18) (C)

Q19) (C)

Q20) (b)

Q21) (a)

Q22) (a)

• Seek time = 30 ns

• Rotational delay (Avg delay)

360 — 60sec

 $\frac{1}{2}$ revolution — ?

$$\Rightarrow \frac{1}{2} \times \frac{60}{360}$$

$$\Rightarrow 0.083 \text{ sec}$$

• Transfer time:

One track Data = $512 \times 512 \text{ B}$
 $= 256 \text{ KB}$

11

SATURDAY - MARCH

WK-10 • 070-295

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	S

Appointments

1 rotational time:

$$360 \text{ rotation} = 60 \text{ sec}$$

$$1 \text{ rotation} = ?$$

$$\Rightarrow \frac{60}{360} \text{ sec}$$

1 rotation time = track Data

Time

$$? \text{ time} = 2 \text{ KB Data}$$

12

SUNDAY 071-294

$$\Rightarrow \frac{60}{360} \text{ sec} * 2 \text{ KB}$$

$$256 \text{ KB}$$

$$\Rightarrow 0.0013 \text{ sec}$$

$$\begin{aligned} \text{Total Time} &= \text{Seek + Avg. Rotational} \\ &\quad \text{time latency} + \text{transfer time} \\ &= 30 * 10 \text{ sec} + 0.083 \text{ sec} + 0.0013 \text{ sec} \\ &= 0.084 \text{ sec} \end{aligned}$$

Q5

APRIL 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
17	18	19	20	21	22	23	24	25	26	27	28	29	30				
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S

Appointments

Transfer rate:

$$\frac{60}{360} \text{ sec} \rightarrow 256 \text{ KB}$$

$$1 \text{ sec} \rightarrow ? \text{ Bytes of Data}$$

$$\Rightarrow \frac{360}{60} \times 256 \text{ KB}$$

$$\Rightarrow 1536 \text{ KBPS}$$

Q23) (b)

$$\# \text{ of tracks} = \frac{\text{Data Storage Distance}}{\text{Intertrack Distance}}$$

$$\Rightarrow \frac{4 \text{ cm}}{0.2 \text{ mm}} \Rightarrow \frac{4 \times 10 \text{ mm}}{0.2 \text{ mm}}$$

$$\Rightarrow 200$$

$$\begin{aligned} \text{Capacity of the Disk} &= 8 * 200 * 20 * 4 \text{ KB} \\ &\Rightarrow 128000 \text{ KB} \end{aligned}$$

$$\Rightarrow 128 \text{ MB}$$

13

MARCH - MONDAY

072-293 • WK-11

APR

NTP

14

TUESDAY - MARCH

WK-11 • 073-292

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	S

Appointments

Q24) (c)

- Surface has 200 tracks
- # of tracks * # sectors on each track

$$\Rightarrow 200 \times 20$$

$$\Rightarrow 4000$$

Q25) (b)

$$\text{Total time} = \frac{\text{Seek time}}{\text{Avg. rotational time}} + \frac{\text{Avg. rotational time}}{\text{Transfer time}}$$

$$= 60 \times 10^{-9} \text{ sec} * 8.33 \times 10^{-3} \text{ sec} + 6.51 \times 10^{-5} \text{ sec}$$

$$\Rightarrow (8.39516 \times 10^{-3}) / 1200$$

$$\Rightarrow 10 \text{ sec}$$

Transfer rate:

$$\frac{60}{3600} \text{ sec} = \frac{512 \text{ KB}}{1 \text{ sec}} ?$$

$$\Rightarrow \frac{3600}{60} * 512 \text{ KB}$$

$$\Rightarrow 30 \text{ MBPS (APPROX)}$$

15

MARCH - WEDNESDAY

074-291 • WK-11

APRIL 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
17	18	19	20	21	22	23	24	25	26	27	28	29	30				
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S

Appointments

Q26) (a)

Q27) OS question

Q28) 0.01

$$x: 10 \text{ MB} \xrightarrow{?} 1 \text{ sec}, \\ 20 \text{ KB} \xrightarrow{?} ?$$

$$\Rightarrow \frac{20 \text{ KB}}{10 \text{ MB}} \text{ sec}$$

$$\Rightarrow 2000 \text{ usec}$$

$$y = \frac{1}{6} (300 + 900) * \frac{1}{600 \text{ MHz}} \text{ sec}^3$$

$$= 2 \text{ usec}$$

$$\% \text{ time CPU} = \left(\frac{y}{x+y} \right) 100 \\ \text{as blocked}$$

$$= 0.01$$

APR

MAY

NMR

16

THURSDAY - MARCH

WK-11 • 075-290

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	F	S	S	M	T	F	S	S	M	T

Appointments

(Q29) 25

ET-PROG TO

$$\frac{10KB}{1B} \approx 18sec$$

$$\Rightarrow \frac{1B}{10KB} sec$$

$$\Rightarrow 100usec$$

ET INT TO

4 usec.

S = ETProg To

ETINT To

$$S = \frac{100}{4}$$

$$S = 25$$

Q

APRIL 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30		
M	T	W	T	F	S	S	M	T	F	S	S	M	T	F	S

Appointments

(Q30) 8

(Q31) 50 (Approx)

Preparation time (x):

1 minute \approx 3000 revolutions.
? time \approx 1 revolution

$$\Rightarrow \frac{60}{3000} sec.$$

• 1 revolution time \approx 1 track data
? time \approx 1 Byte.

$$\Rightarrow \frac{60}{3000 * 512 * 10^3}$$

$$\Rightarrow 39.06 ns$$

Transfer time (y):

In one machine cycle, one word data is transferred i.e. 100ns.

Q 1. time CPU is blocked = $\left(\frac{y}{x+y}\right) 100$
 $= 50\%$

17

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076-289 • WK-11

APR

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18

SATURDAY - MARCH

WK-11 • 077-288

Q32) 3.4

ET_{INT-IO}

Prog

I ₁ : Initialization	- 1C
I ₂ : Initialization	- 1C
I ₃ : Load	- 2C
I ₄ : Store	- 2C
I ₅ : INC	- 1C
I ₆ : DEC	- 1C
I ₇ : If	- 1C

19

SUNDAY 078-287

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	F	S	S	M	T	W	T	F	S	S

Appointments

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

M

T

W

T

F

S

S

APRIL 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
17	18	19	20	21	22	23	24	25	26	27	28	29	30			
M	T	W	T	F	S	S	M	T	F	S	S	M	T	W	F	S

Appointments

9 Chapter - 6

10 Q1) (d)

11 Q2) (d)

12 Q3) (a)

$$\cdot 113 + (-111) + 7.51$$

$$\begin{array}{r} \swarrow \\ 2 + 7.51 \end{array}$$

$$\Rightarrow 9.51$$

$$\cdot 113 + (-111 + 7.51)$$

$$\begin{array}{r} \swarrow \\ -103.49 \end{array}$$

Round off upto 3 digits

$$\begin{array}{l} \Rightarrow 113 - 103 \\ \Rightarrow 10 \end{array}$$

20

MARCH - MONDAY

079-286 • WK-12

APR

MAY

JUN

21

TUESDAY - MARCH

WK-12 • 080-285

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							

Appointments

Q4) (a)

Data: 0.15625×2^5

Biased Exponent = $5 + 3$

= 36

$(100100)_2$

$0.15625 \Rightarrow 0.00101$

~~0|0100100|00+01000000000000000000~~

~~0|0100100|00101000000000000000000000~~

Q5) c

Data: 0.001010000×2^5



1.010000×2^2

$BE \Rightarrow 2 + 3$

$\Rightarrow 33$

$\Rightarrow 10001$

~~0|0100001|010000000000000000000000~~

22

MARCH - WEDNESDAY

081-284 • WK-12

APRIL 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30		

Appointments

Q6) (c)

~~1|0111111|1010000000000000000000000000~~

$Bias = 127$

$AE = BE - Bias$

= $127 - 127$

= 0

Data: $-1.101 * 2^0$

~~-1.625~~

Q7) Solution available in Gate Solutions Book.

Q8) a

Q9) 4D3D

Data: $0.239 * 2^{13}$

$BE = 13 + 64$

= 77

= 1001101

23

THURSDAY - MARCH

WK-12 • 082-283

MARCH 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31							
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S	S

Appointments

$$0.239 \Rightarrow 0.00111101000101$$

0	100	110	110011101
---	-----	-----	-----------

4 D 3 D

$$Q10) 4AE8$$

$$0.239 \times 2^{13}$$

Normalized,

$$0.00111101000101 * 2^{13}$$

$$\downarrow \\ 1.11101000101 * 2^{10}$$

$$BE = 10 + 64$$

$$\Rightarrow 1001010$$

0	1001010	11101000
---	---------	----------

4 A E 8

✓

24

MARCH - FRIDAY

083-282 • WK-12

APRIL 2017

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
17	18	19	20	21	22	23	24	25	26	27	28	29	30				
M	T	W	T	F	S	S	M	T	W	F	S	S	M	T	W	F	S

Appointments

$$Q11) +1$$

$$3F800000$$

0	10111111000000000000000000000000
---	----------------------------------

$$AE = BE - Bias$$

$$= 127 - 127 \\ = 0$$

$$Data: 1.M * 2^0$$

$$+ 1.0 * 2^0$$

$$\Rightarrow +1$$

APR

MAY

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