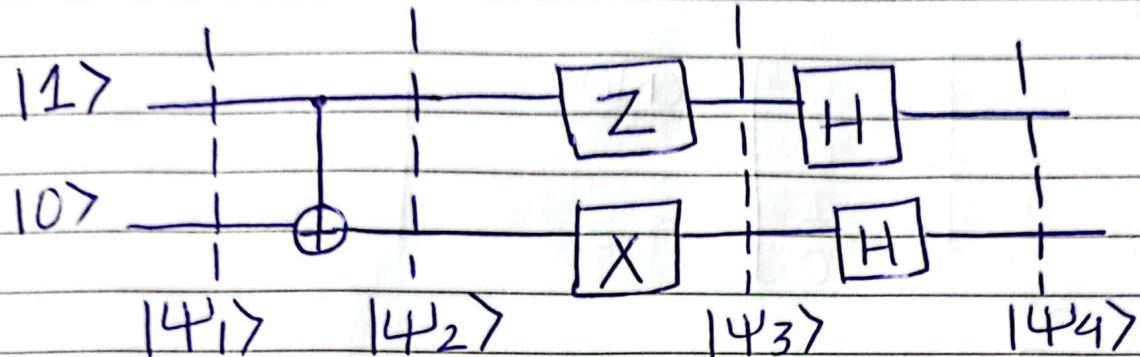




| 10 >

WEDNESDAY 03 محرم 5



$$|14_1\rangle = |10\rangle$$

$$|14_2\rangle = |11\rangle$$

$$|14_3'\rangle = -|11\rangle$$

$$|14_3\rangle = -|10\rangle$$

THURSDAY 04 محرم 6

$$|14_4\rangle = -H^{\otimes 2}|10\rangle$$

$$= -\{H|11\rangle H|10\rangle\}^2$$

$$= -\left(\frac{|10\rangle - |11\rangle}{\sqrt{2}}\right)\left(\frac{|10\rangle + |11\rangle}{\sqrt{2}}\right)$$

$$|14_4\rangle = -\frac{1}{2}(|100\rangle + |101\rangle - |110\rangle - |111\rangle)$$

August 2022

1444 محرم

(2)

05 FRIDAY

unitary matrix :-

$$S_1 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix} = \text{CNOT}$$

$$S_2 = Z \otimes X$$

$$= \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \otimes \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 \\ 0 & 0 & -1 & 0 \end{bmatrix}$$

06 SATURDAY 07 SUNDAY

محرم 8 محرم 9

$$S_3 = H \otimes H$$

$$= \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \otimes \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$$

$$= \frac{1}{2} \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 \\ 1 & 1 & -1 & -1 \\ 1 & -1 & -1 & 1 \end{bmatrix}$$

$$S_3 \times (S_2 \times S_1)$$

$$S_2 \times S_1 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 \\ 0 & 0 & -1 & 0 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & -1 \end{bmatrix} = (S_2 \times S_1)$$

$$S_3 \times (S_2 \times S_1)$$

$$= \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 \\ \frac{1}{2} & \frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} \\ 1 & -1 & -1 & 1 \end{bmatrix} \times (S_2 \times S_1)$$

THURSDAY 18 محرم 20

$$= \frac{1}{2} \begin{bmatrix} 1 & 1 & -1 & -1 \\ -1 & 1 & -1 & 1 \\ \frac{1}{2} & \frac{1}{2} & \frac{1}{2} & \frac{1}{2} \\ -1 & 1 & 1 & -1 \end{bmatrix} = S_3 \times (S_2 \times S_1)$$

August 2022 (4)

1444 محرم

19 FRIDAY
رمضان 21

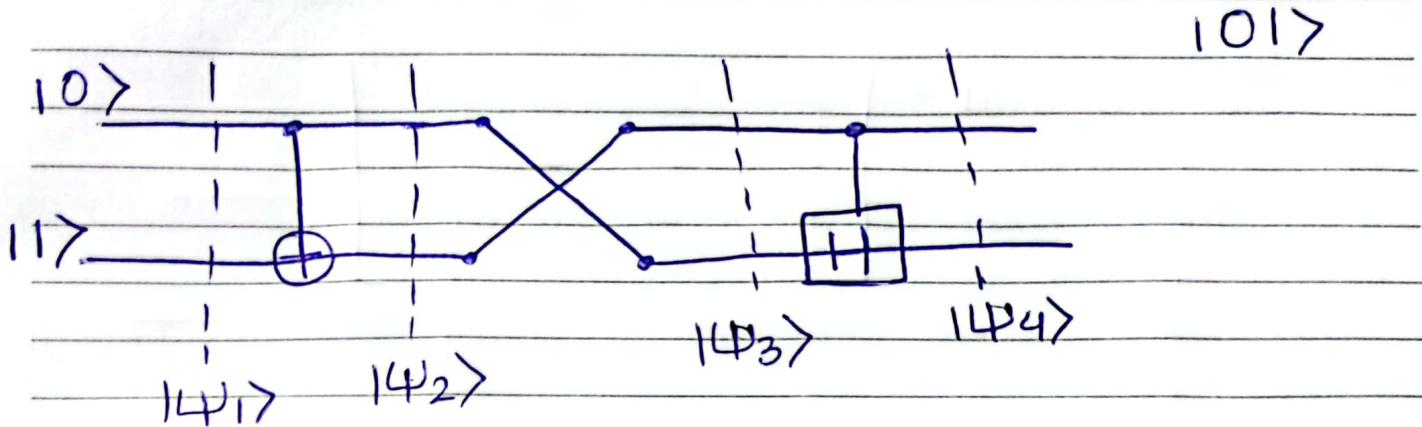
$$H^{\otimes 3} (|111\rangle + |101\rangle + |100\rangle)$$

	111	101	100
000	+	+	+
001	-	+	*
010	*	*	+
011	*	*	+
100	-	-	-
101	+	*	*

20 SATURDAY 21 SUNDAY
رمضان 22 رمذان 23

110	*	*	-
111	-	*	*

$$= \left(3|1000\rangle - |001\rangle + |010\rangle + |011\rangle - 3|100\rangle + |101\rangle - |110\rangle - |111\rangle \right) \frac{1}{2\sqrt{2}}$$



$$\Rightarrow |14_1\rangle = |101\rangle$$

$$|14_2\rangle = |101\rangle$$

$$|14_3\rangle = |110\rangle$$

$$|14_4\rangle = |11\rangle H |10\rangle$$

$$= |11\rangle \left(\frac{|10\rangle + |11\rangle}{\sqrt{2}} \right)$$

$$|14_4\rangle = |110\rangle + |111\rangle \left(\frac{1}{\sqrt{2}} \right).$$

TUESDAY 06 صفر 10

$$\mathcal{S}_3 \times (\mathcal{S}_2 \times \mathcal{S}_1)$$

$$\mathcal{S}_1 = \text{CNOT} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}.$$

September 2022

صفر 1444

07 WEDNESDAY

صفر 11

⑥

$$S_2 = \text{SWAP} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$S_3 = CH = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ 0 & 0 & \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} \end{bmatrix}$$

08 THURSDAY

$$(S_2 \times S_1) = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

$$S_3(S_2 \times S_1) = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ 0 & 0 & \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} \end{bmatrix} \times (S_2 \times S_1)$$

$$= \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 \\ 0 & \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} & 0 \end{bmatrix} = S_3(S_2 \times S_1)$$

SUNDAY 11 SATURDAY 10
صفر 15 صفر 14

September 2022

(8)

صفر 1444

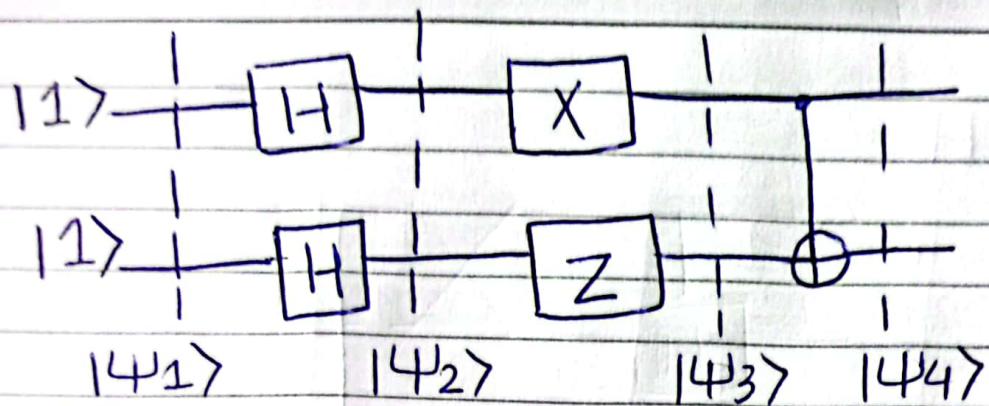
12 MONDAY
صفر 16

$$H^{\otimes 3} ((111\rangle + 1100\rangle + 1110\rangle)$$

	111	100	110
000	+	+	+
001	*	*	+
010	-	*	*
011	+	*	*
100	-	-	-
13 TUESDAY صفر 17			
101	*	*	-
110	+	*	*
111	-	*	*

$$= \{ 3|1000\rangle + |001\rangle - \cancel{|000\rangle} + |011\rangle - 3|100\rangle$$

$$- |101\rangle + |110\rangle - |111\rangle \} \frac{1}{2\sqrt{2}}.$$



$$|141\rangle = |111\rangle$$

$$|142\rangle = H^{\otimes 2} |111\rangle$$

$$= H|1\rangle H|1\rangle$$

$$= \left(\frac{|0\rangle - |1\rangle}{\sqrt{2}} \right) \left(\frac{|0\rangle - |1\rangle}{\sqrt{2}} \right)$$

$$|142\rangle = \frac{1}{2} (|00\rangle - |01\rangle - |10\rangle + |11\rangle)$$

SUNDAY 14 SATURDAY 13
رمضان 16 محرم 15

$$|143\rangle = \frac{1}{2} (|10\rangle - |11\rangle - |00\rangle + |01\rangle).$$

$$|143\rangle = \frac{1}{2} (|10\rangle + |11\rangle - |00\rangle - |01\rangle).$$

$$|144\rangle = \frac{1}{2} (|11\rangle + |10\rangle - |00\rangle - |01\rangle)$$

August 2022

1444ھ

15 MONDAY

(10)

$$S_1 = H \otimes H$$

$$= \frac{1}{2} \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 \\ 1 & 1 & -1 & -1 \\ 1 & -1 & -1 & 1 \end{bmatrix}$$

$$S_2 = X \otimes Z$$

$$= \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} \otimes \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

16 TUESDAY

$$= \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \\ 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix} .$$

$$S_3 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix} = \text{CNOT}$$

$$S_3 \times (S_2 \times S_1)$$

$$(S_2 \times S_1) = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \\ 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix} \times \frac{1}{2} \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 \\ 1 & 1 & -1 & -1 \\ 1 & -1 & -1 & 1 \end{bmatrix}$$

$$(S_2 \times S_1) = \frac{1}{2} \begin{bmatrix} 1 & 1 & -1 & -1 \\ -1 & 1 & 1 & -1 \\ 1 & 1 & 1 & 1 \\ -1 & 1 & -1 & 1 \end{bmatrix}$$

$S_3 \times (S_2 \times S_1)$

$$= \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix} \times (S_2 \times S_1)$$

TUESDAY 23
رمضان 25

$$= \frac{1}{2} \begin{bmatrix} 1 & 1 & -1 & -1 \\ -1 & 1 & 1 & -1 \\ -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix} = S_3 \times (S_2 \times S_1)$$

$$H^{\otimes 3} (1000\rangle + 1101\rangle + 1110\rangle)$$

	000	101	110
000	+	+	+
001	*	*	+
010	+	*	+
011	*	*	-
100	*	*	-

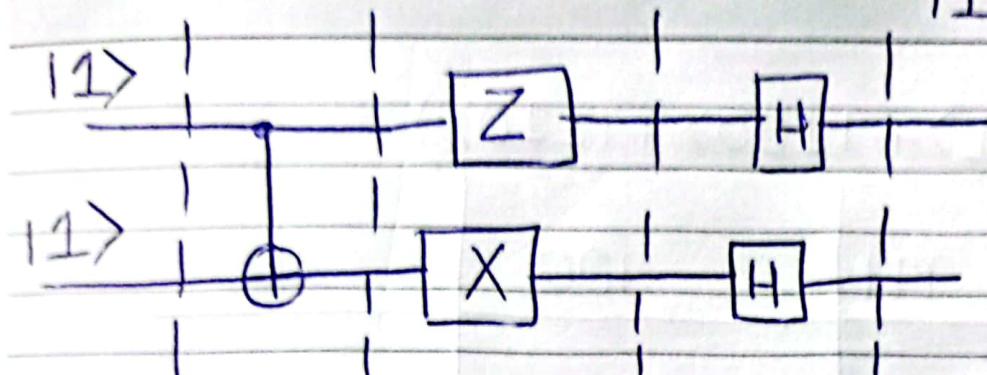
 SUNDAY 28 SATURDAY 27
 1 صفر 29 صفر

101	+	*	+
110	*	+	+
111	+	+	+

$$\begin{aligned}
 &= \{ 3|1000\rangle + 1001\rangle + 1010\rangle - 1011\rangle - 1100\rangle \\
 &\quad + 1101\rangle + 1110\rangle + 3|1111\rangle \} \frac{1}{\sqrt{2}} .
 \end{aligned}$$

|111>

WEDNESDAY 14
ج ١٩



|141> |142> |143> |144>

$$|141> = |111>$$

$$|142> = |110>$$

$$|143> = -|110>$$

$$|143> = -|111>$$

THURSDAY 15
ج ٢٠

$$|144> = H^{\otimes 2} \Rightarrow -|111>$$

$$= -H|11>H|11>$$

$$= -\left(\frac{|10> - |11>}{\sqrt{2}}\right)\left(\frac{|10> - |11>}{\sqrt{2}}\right)$$

$$|144> = -\frac{1}{2}(|100> - |101> - |110> + |111>).$$

unitary matrix is same as on
pg # 2, 3.

September 2022

صفر 1444

16 FRIDAY
صفر 20

(14)

$H^{\otimes 3}$

$(|1111\rangle + |1100\rangle + |1110\rangle)$

	111	100	110
000	+	+	+
001	*	*	+
010	-	*	+
011	+	*	+
100	-	-	-
17 SATURDAY	18 SUNDAY		
101	*	+	-
110	+	+	*
111	-	*	*

$$= \{ |1000\rangle + |001\rangle - |1010\rangle + |1011\rangle - |1100\rangle$$

$$- |1101\rangle + |1110\rangle - |1111\rangle \} \frac{1}{2\sqrt{2}}$$