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OCW

Q1 (i) Biggest advantage a file system has over a proper database management system is the ease of use for updating data, or even sharing the data.

(ii) Since the file needs to be updated by simply typing the data in, there is little room for any semantic or syntax fault.

(iii) A file system actually makes sense for managing a very limited amount of data. There hardly is ever a need to make a complete database management system when a person only has to manage like 5 variables.

Eg → for a casual movie watcher, a file system works fine if they only want to keep track of the movies they watch.

(iv) Sharing data through a file system is way easier than a database. The other person doesn't need to have a deep understanding of databases to simply read a text file.

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(v) A file to manage limited data is the default option most people think of, since designing a database takes skill and effort and a person needs to be a somewhat experienced coder.

Q2 (i) (a)

(ii) (a)

(iii) $H_2 = \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$

$$H_4 = \begin{bmatrix} 1\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} & 1\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \\ 1\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} & -1\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \end{bmatrix}$$

$$\Rightarrow H_4 = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 \\ 1 & 1 & -1 & -1 \\ 1 & -1 & -1 & 1 \end{bmatrix}$$

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$$H_8 = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \\ 1 & 1 & -1 & -1 & 1 & 1 & -1 & -1 \\ 1 & -1 & -1 & 1 & 1 & -1 & -1 & 1 \\ 1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 \\ 1 & -1 & 1 & -1 & -1 & 1 & -1 & 1 \\ 1 & 1 & -1 & -1 & -1 & -1 & 1 & 1 \\ 1 & -1 & -1 & 1 & -1 & 1 & 1 & -1 \end{bmatrix}$$

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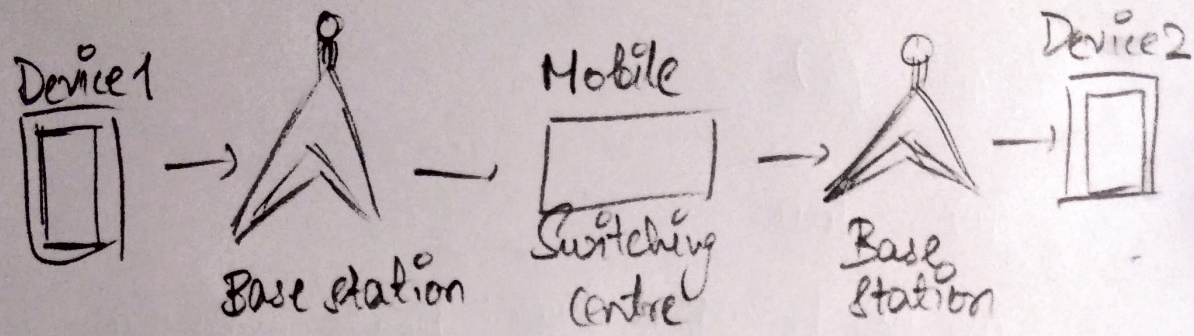
Q2 (v)



The base station connected to device 1 requests the mobile switching centre (MSC) to establish a connection with the required user.

Q3(i) Length $L = 2000$ bytes $= 2000 \times 8$ bits

distance $d = 3400$ km $= 3400 \times 10^3$ m

propagation speed $s = \cancel{2} \times 10^8$ m/s
2.5

Transmission rate $R = 10 \times 10^6$ bps

~~Transmission delay $= \frac{L}{R} = \frac{2000}{10^7} = 2 \times 10^{-4}$ s $= 0.2$ ms~~

~~Propagation delay $= \frac{d}{s} = \frac{3400 \times 10^3}{2 \times 10^8} = 17 \times 10^{-3}$ s $= 17$ ms~~

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~~$\left(\frac{L}{R}\right)$ Transmission delay $= \frac{2000 \times 8}{10^7} = 16 \times 10^{-4}$ s $= 1.6$ ms~~

Propagation delay $= \frac{d}{S} = \frac{3400 \times 10^3}{2.5 \times 10^8} = 13.6$ ms

Ans ⇒ (a) 13 ms

(ii) (b)

(iii) True

(iv) (a) Transport layer: Deals with the transport of a packet, making sure there are no errors, no duplication, no loss and that the packet reaches its destination.

(b) Network layer: Acts as an interface between host and network. Responsible for data routing, dealing with congestions/dead locks.

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(C) Data-Link layer : Routes the data provided by network layer.
Also checks for any computational errors.

(V)

TCP	UDP
→ Establishes connection between the source and destination, gives conformation if the transfer ~~propagation~~ of data is successful.	→ There is no connection established, and there is no conformation to whether the data reached its destination or not.
→ Used most of the time due to its reliability.	→ Unreliable but faster, used when very small amount of data has to be transferred.

(vi) A worm is a self replicating malware which is recieved silently and executes itself.

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Q4 (a) ~~8086~~ 8085 is a 40 pin microprocessor, with 20 address lines which result in 2^{20} bytes of memory. Pin 0 is ground, 40 is high.

~~Out of the~~ The address pins A_{16} - A_{19} also act as signal lines (S_1, S_2, S_3 and S_4).

S_3	S_4	Function
0	0	Extra segment
0	1	Stack segment
1	0	Code segment
1	1	Data segment.

A state pin decides whether the microprocessor is in Maximum mode or Minimum.
In minimum mode, the microprocessor takes commands from the CPU, and in the minimum mode it issues commands to the CPU.

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(b) Content of registers A, R_3 and R_2

```
ORG 0000H
MOV R0, #31 (i)
MOV R1, #01H (ii)
MOV A, #00 (iii)
MOV R2, A (iv)
MOV A, @R0 (v)

Back: INC R0 (vi)
      ADD A, @R0 (vii)
      JNC Level1
      INC R2 (viii)

Level1: DJNZ R1, Back
        MOV R3, A (ix)
        INC A

IIITS: SIMP IIITS
       END
```

(i) R_0 has value 31, R_1 has 1 and (ii)

(iii) A has value 0

(iv) R_2 is now with value 0 from A.

(v) A now has the address of R_0, and the value ~~31~~ (FA)H.

(vi) R_0 increased to ~~32~~ 2B.

(vii) Adding the value ~~FA~~ to A, now stores ~~2FA~~ 126.

(viii) R_2 increased to 1.

(ix) R_3 filled with A's value, ie, 126.

$\Rightarrow$ Final $A = 126,\ R_3 = 126,\ R_2 = 1$

```
 1
 FA
 2B
----
 126
```