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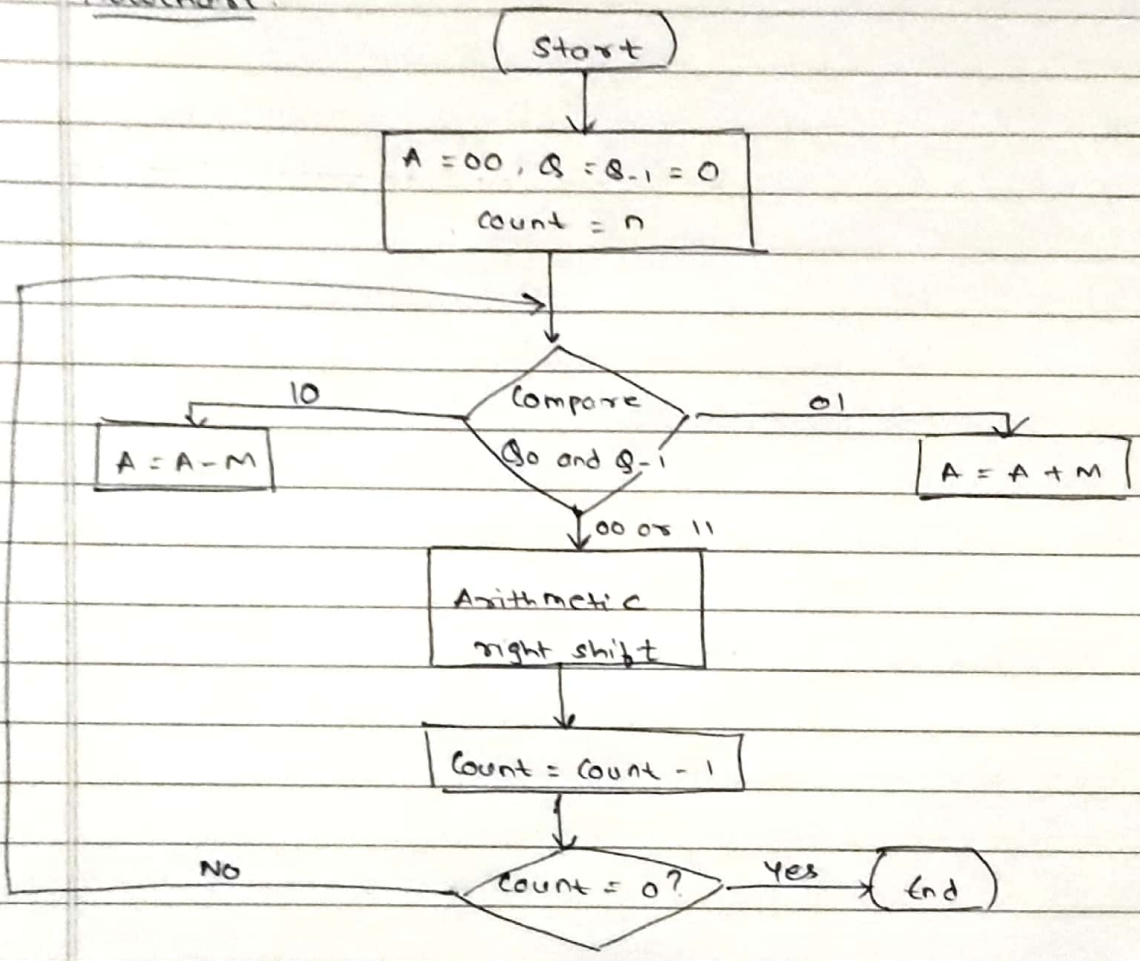
Computer Engineering

POA - Assignment 1

1) Examples on signed and unsigned multiplications Algorithms

→ Signed Algorithm [Booth's Algorithm]

Flowchart:



eg: -7 x -3

m = -7 | Q = -3

m = 1111 | Q = 1011

m' = 1000 | Q' = 1100

m'' = 1001 | Q'' = 1101

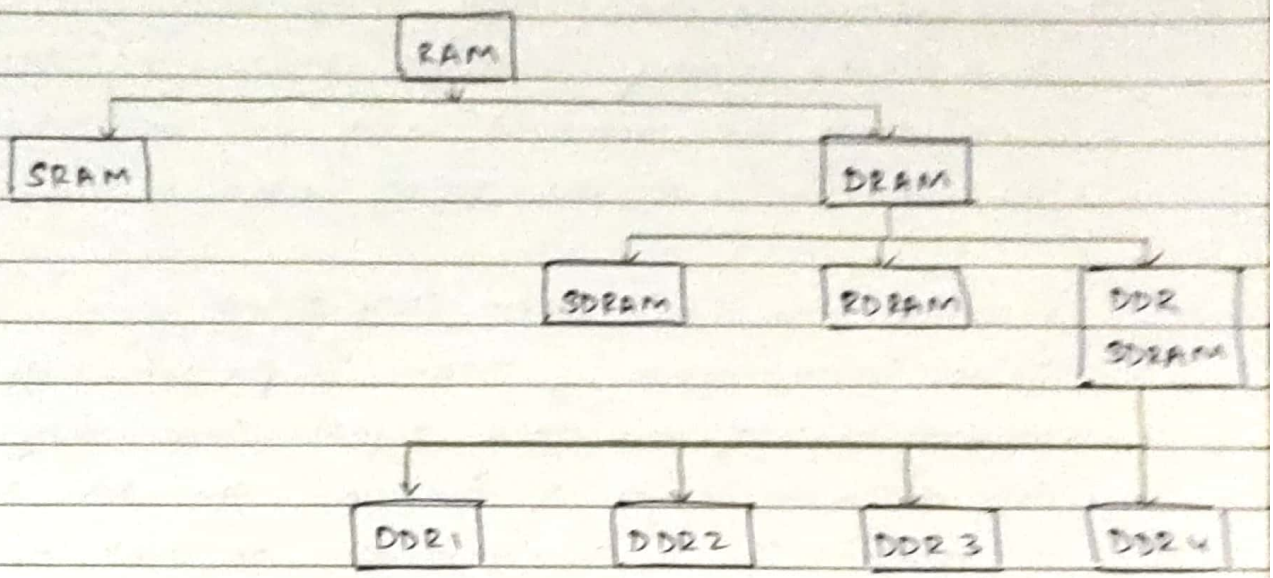
A	Q	Q-1	Action
0000	1101	0	Initialize, n=4
0111	1101	0	A = A - M
0011	1110	1	ARS, n=3
1100	1110	1	A = A+M
1110	0111	0	ARS, n=2
0101	0111	0	A = A-M
0010	1011	1	ARS, n=1
0001	0101	1	ARS, n=0

$\therefore (0001\ 0101) = (21)_{10}$

$\therefore -7 \times -3 = 21$

Q. 2) Types of RAM.

→



1) SRAM (Static RAM)

It is made up of flip flops. It keeps data in the memory as long as power is supplied to the system unlike DRAM, which has to be refreshed periodically. As such SRAM is faster but also more expensive

2) DRAM (Dynamic RAM)

It is widely used as a computer main memory. It is a type of RAM which allows you to store each bit of data on a seperate capacitor within a specific integrated circuit.

Types of DRAM:

a) SDRAM

b) DDRAM

c) DDRSDRAM

a) Synchronous DRAM (SDRAM)

It synchronizes the memory speed with CPU clock speed so that the memory controller knows the exact clock cycle when the requested data will be ready. It performs its operations on the rising edge of the clock signal.

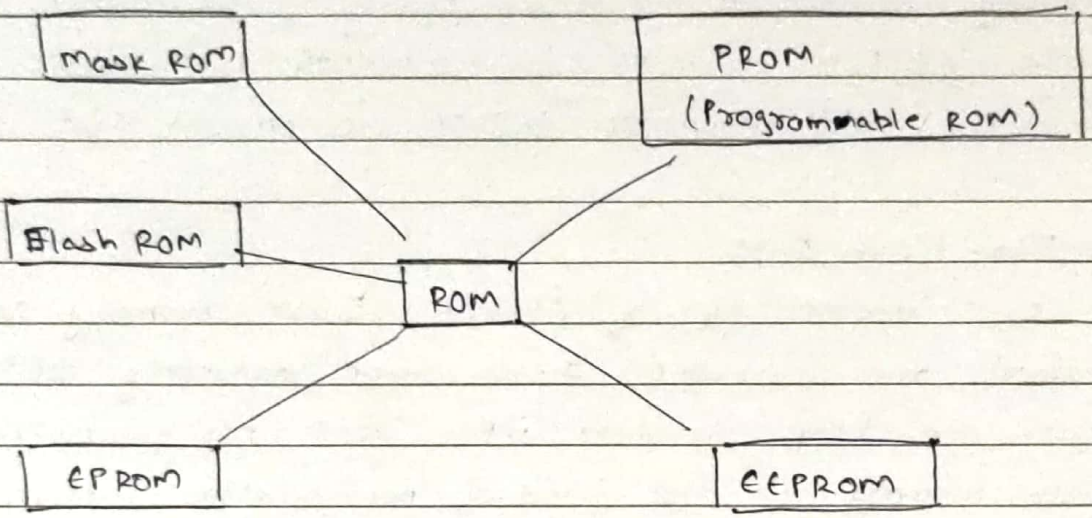
b) Double Data Rate SDRAM (DDR SDRAM)

It is faster version of SDRAM. It performs its operations on both edges of the clock signal. Since, they transfer data on both edges of the clock, the data transfer rate is doubled. To access the data on high rate, the memory cells are organized into the groups and each group is accessed seperately.

c) Solid - State Drive (SSD RAM or RD RAM)

It uses DRAM or SRAM chips, both of which are volatile. This means that a RAM based drive will lose its contents when the power is turned off.

Q. 3) Types of ROM



1) MROM (masked ROM)

The very first ROM's were hard-wired devices that contained pre-programmed set of data or instructions. These kind of ROM's are known as masked ROM's, which are inexpensive.

2) PROM (Programmable ROM)

It is a ROM which can be modified only once by the user. The user buys a blank ROM and enters the desired contents using a PROM program. Inside the PROM chip, there are small fuses which are burnt open during programming.

3) EPROM (Erasable Programmed ROM)

It allows you to write rewrite it many times. These chips features a quartz window through which a specialized EPROM programmer emits a specific frequency of ultraviolet light.

4) EEPROM (Electrically Erasable Programmable ROM)
It is a special type of PROM that can be erased by exposing it to an electrical charge. Like other types of PROM, EEPROM retains its contents even when the power is turned off. However EEPROM is not as fast as RAM.

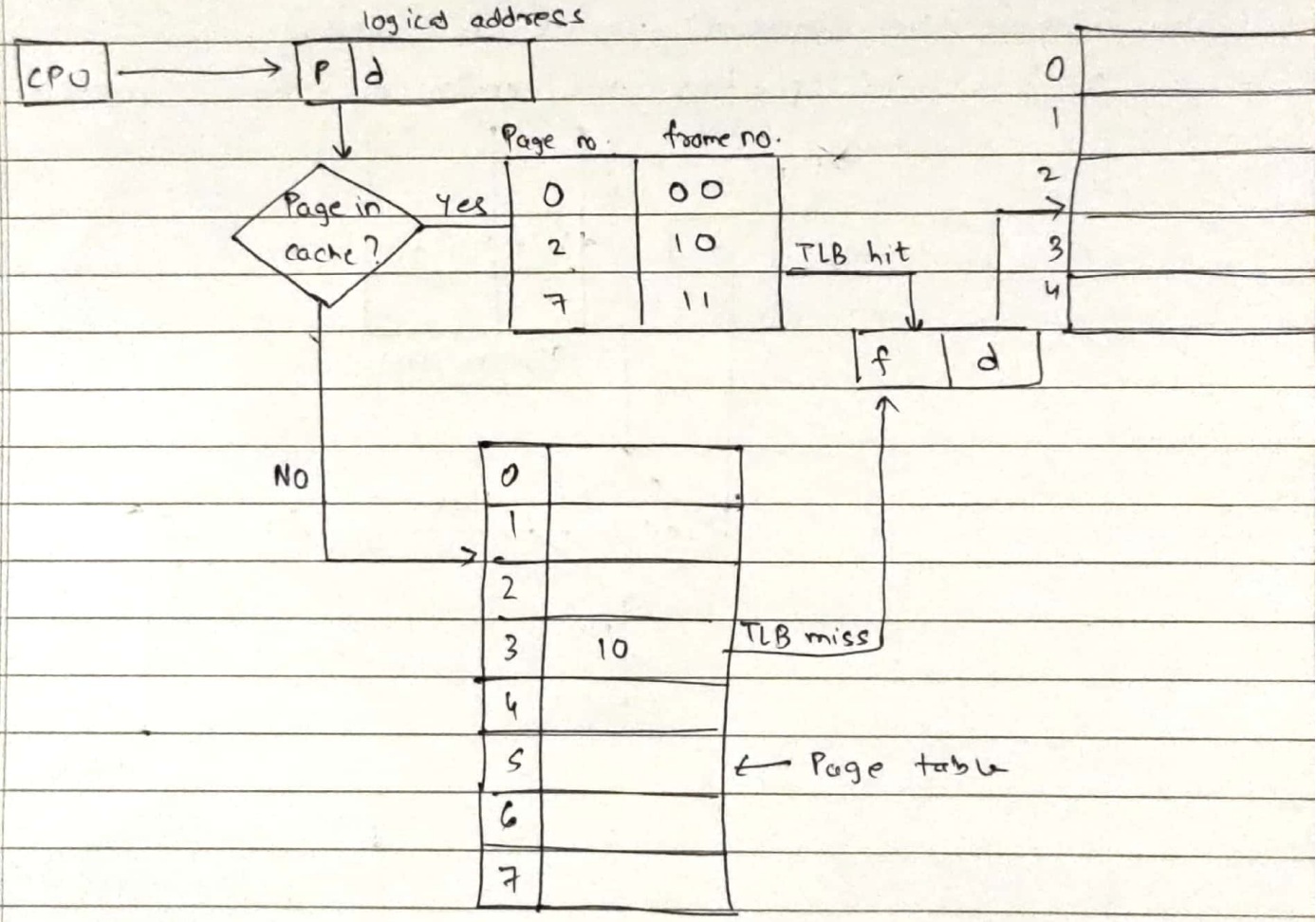
5) Flash ROM
It is a modern type of EEPROM. Flash memory can be erased and rewritten faster than ordinary EEPROM. Flash can keep its data input with no power at all. Flash memory is one kind of non-volatile memory. It is slower than RAM but faster than hard drives. It is mostly used in small electronics because it is small and has no memory parts.

Q. 4) Explain Paging and Segmentation.

→ Paging:
It is a memory management schema that eliminates the need for contiguous allocation of physical memory. The schema permits the physical address space of a process to be non-contiguous.
- logical address: Address generated by CPU
- Physical address: Address actually available on memory unit.

The mapping from virtual to physical address is done by the MMU which is a hardware device and this mapping is known as paging technique.
The physical address space is conceptually divided into a

a number of fixed-sized blocks, called frames.
The logical address space is also split into fixed size blocks, called pages.
Page size = frame size.



Segmentation:

- A process is divided into segments. The chunks that a program is divided into which are not necessarily all of the same sizes are called segments.
- A tables store the information about all such segments and is called segment table.

• Segment Table : It maps 2-dimensional logical address into one dimensional physical address. It's each table entry has :

(1) Base address : It contains the starting physical address where the segment reside in memory.

(2) limit : It specifies the length of the segment.