

Task-2

Majloth. Nikhitha

1. List out the semiconductor products and its corresponding companies?

Ans: • product: Microprocessors

cpu for desktops, laptops, servers and mobile phones

company: Intel, AMD, ARM, Qualcomm, Apple, NVIDIA

• product: Memory (DRAM, NANDflash memory)

company: Samsung, Micron Technology, Toshiba, Western digital logic chips

• product: Microcontrollers, FPGA's, RF chips, cpus

company: TSMC, Samsungfoundry, Intel, AMD, Analog Semiconductors.

• product: Amplifiers, Semiconductors, converters, voltage regulators, Power Management IC's

company: TI, Analog devices, Maxim Integrated products discrete sc.

• product: power Semiconductors, diodes, transistors, resistors, Capacitors, Inductors

company: Infineon technologies, Vishay Intertechnology, STMicroelectronics

• product: Imagesensors, temperature sensors, accelerometers, Gyroscopes

company: Sony, Samsung, Bosch, NXP, STMicroelectronics

• products: power electronics involve MOSFET's, IGBT's, power modules, inverters, converters

company: Infineon Technologies, ON semiconductor, Fuji Electric

• products: RF components involves RF switches, filters, Mixers, Oscillators

company: Qorvo, Skyworks, NXP, Broadcom

• products: optical components: LEDs, lasers, photodetectors, optical amplifiers, optical modulators

company: Samsung, LG Innotek, Broadcom, Osram

Products from specific companies:

• AMD: They Manufacture Microprocessors, produces wide range of semiconductor products including graphic cards, FPGAs and logic chips

• Intel: Intel is a leading Manufacturing of Microprocessors Memory, logic chips.

• TSMC: TSMC is world's largest foundry, Manufacture chips for other companies. It is Major supporter for Apple, NVIDIA and Qualcomm

• BOSCH: Manufactures MEMS devices & sensors

• Qualcomm: Manufactures Snapdragon processors, 5G & 4G modems, Wi-Fi bluetooth chips, RF transceivers

② Why there is a shift from BJT to MOSFET and MOSFET to FINFET?

Ans:- current technology nodes of:

BJT : 22nm

MOSFET : 7nm

FINFET : 5nm

As you can see there is a degradation of transistors Manufacture - closing in a chip from BJT to MOSFET and MOSFET to FINFET

• BJT's to MOSFET's:

⇒ power Efficiency & Scaling: MOSFET's gained prominence over BJT's due to their Superior power Efficiency and Scalability MOSFET's operate on the principle of voltage control offering high i/p impedance, Low power consumption etc over BJT

⇒ MOSFET's are smaller in size and has faster switching speeds Making them suitable for high frequency applications

⇒ CMOS Technology which become modern integrated circuits offers low power consumption and also digital logic circuit design.

• MOSFET's to FINFET's:

⇒ Scaling limitations: mosfet's were scaled down to smaller sizes, they face challenges to short-channel effects increasing leakage currents

⇒ Finfets feature a three-dimensional fin-like structure for the channel, offering better control over the channel

→ finetec providing superior control, reduced leakage power and better scalability.

③ What are the latest laptop processors from AMD, Intel and Apple :- frequency and node?

Ans:- AMD:-

- AMD Ryzen 9 7000 series

1. AMD Ryzen 9 7450X3D

clock frequency : 4.2 GHz (clock base)

Technology node : 7nm 5nm

Max. clock frequency : upto 5.7 GHz

2. AMD Ryzen 9 7945HX3D:-

Base clock : 3.7 GHz

Max. Boost clock : upto 5.4 GHz

Technology node : 7nm 5nm FINFET

Intel:-

1. Intel Core i9 14th generation

Frequency : upto 6.0 GHz

processor family : meteor lake

Technology node : 5nm process node

Apple:-

1. M2 pro and M2 Max:

M2 pro:-

frequency : upto 3.4 GHz

Technology node : 5nm

M2 max:-

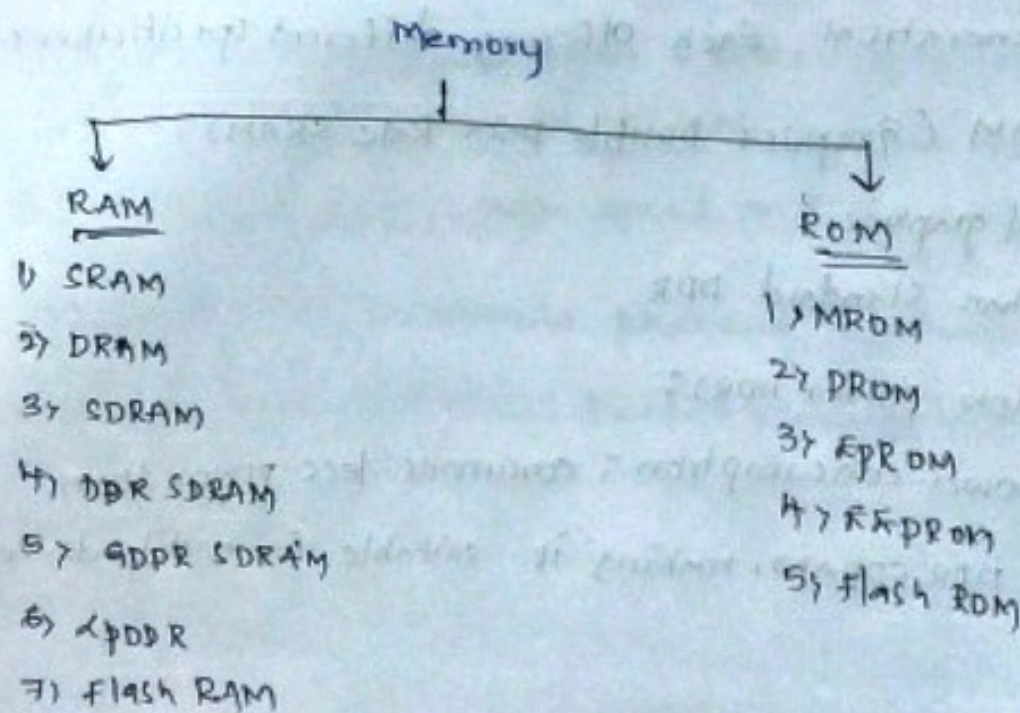
Frequency : upto 3.54 GHz

Technology node : 5nm

④ What are different job roles available in VLSI field?

- Ans:-
- RTL design Engineers
 - Verification Engineers
 - PFT Engineer
 - STA Engineers
 - physical design Engineers
 - Layout Engineers
 - Analog design Engineers
 - Digital design Engineer
 - Ip design Engineers
 - soc Architect
 - FPGA design Engineers

⑤ Evolution of Memories:



RAM:-

- 1) SRAM, (Static RAM): Offers the fastest access times of all RAM types

- ⇒ Volatile: lose data when power is lost
- ⇒ More expensive
- 2) DRAM (Dynamic RAM):
 - ⇒ slower than SRAM, used for general-purpose applications
 - ⇒ Volatile
 - ⇒ less expensive
- 3) SDRAM (Synchronous RAM):
 - Synchronizes its operation with the system clock, enhanced data transfer than DRAM
 - widely used
- 4) DDR SDRAM (Double Data Rate SDRAM):
 - Improved performance (transfers data on both rising & falling edges of the clock signal)
 - Multiple generations each offering different specifications
- 5) GDDR SDRAM (Graphics Double Data Rate SDRAM):
 - Optimised graphics
 - Faster than standard DDR
- 6) LPDDR (Low-power DDR):
 - Reduced power consumption: consumes less power than standard DDR SDRAM, making it suitable for mobile devices.

ROM:-

- ① MROM (Masked ROM):
 - oldest and simplest ROM, which is low cost
 - Data is permanently programmed during the chip manufacturing
 - NOT reprogrammable

② PROM (programmable ROM):

- Data can be programmed once using a special device called a PROM programmer
- less flexible, used in applications where the data is unlikely to change

③ EPROM (Erasable programmable ROM):

- Data can be erased using ultraviolet light and then reprogrammed

④ EEPROM (Electrically Erasable programmable ROM):

- Data can be erased and reprogrammed electronically
- Most versatile type of ROM

⑤ Flash ROM:

- A type of EEPROM
- widely used in USB flash drives, SSDs (Solid state drives) and other storage devices
- offers high density, high speed and low power consumption

6. What are latest mobile processors available - from Qualcomm and Mediatek: Frequency and node.

Ans:- Qualcomm:

- Snapdragon 8 Gen 3

clock speed (Freq): 3.36GHz

process node & technology: 4nm

- Snapdragon 8 Gen 2

clock speed: 3.36GHz

process node: 4nm

Mediatek:-

- Mediatek Dimensity 9300

→ clock speed : 4x Arm cortex-x4 at 3.25GHz

: 4x Arm - A720 upto 2.05GHz

process node : 3rd gen TSMC 4nm chip

- Mediatek Dimensity 9200+

→ clock speed : 1x Arm cortex-x3 at 3.25GHz

3x Arm cortex-A715 upto 3.05GHz

4x Arm cortex-A510 upto 2.05GHz

→ process node : 4nm TSMC chip.