

ASSIGNMENT 1

1. List out the semi conductor products and its corresponding companies.

A semiconductor is a material that has electrical conductivity between that of a conductor and an insulator.

Following are the list of products with its specified companies:

★ **Microprocessors:**

- Intel, AMD, Qualcomm, Apple (custom-designed processors).

★ **Graphics Processing Units (GPUs):**

- NVIDIA, AMD.

★ **Memory Chips:**

- Dynamic Random-Access Memory (DRAM): Samsung, SK Hynix, Micron.
- NAND Flash Memory: Samsung, Toshiba (now part of Kioxia), Western Digital.

★ **Integrated Circuits (ICs):**

- Texas Instruments, Analog Devices, STMicroelectronics.

★ **Field-Programmable Gate Arrays (FPGAs):**

- Xilinx (now part of AMD), Intel (Altera).

★ **Analog Semiconductors:**

- Analog Devices, Texas Instruments.

★ **Power Management ICs:**

- Texas Instruments, ON Semiconductor, Maxim Integrated.

★ **Radio-Frequency Integrated Circuits (RFICs):**

- Qualcomm, Broadcom, Skyworks Solutions.

★ **Microcontrollers:**

- Atmel (now part of Microchip Technology), STMicroelectronics, NXP Semiconductors.

★ **System-on-Chip (SoC):**

- Broadcom, MediaTek, Qualcomm, Apple.

★ **Semiconductor Equipment Manufacturers:**

- ASML, Applied Materials, Lam Research.

★ **Power Semiconductors:**

- Infineon Technologies, ON Semiconductor, STMicroelectronics.

★ **Sensors** (including MEMS):

- Bosch Sensortec, STMicroelectronics, InvenSense (now part of TDK).

★ **Optoelectronics** (LEDs, Laser Diodes):

- Cree, Nichia, Osram, Finisar (acquired by II-VI Incorporated).

★ **Communication Chips:**

- Qualcomm, Broadcom, Marvell Technology.

2. What are the latest laptop processors from AMD, Intel and Apple :
Frequency and node.

Latest laptop processor:

- **AMD (AMD Ryzen 9 5900HX)**

Frequency : 3.3 GHz - 4.6 GHz

Node : 7nm

- **Intel (Intel Core i9-12900K)**

Frequency : 3.2GHz - 5.3GHz

Node : 10nm

- **Apple (Apple M1 Max)**

Frequency : 3.2GHz -3.8GHz

Node : 5nm

3. What are the latest mobile processors available from Qualcomm and mediatek : Frequency and node.

Latest mobile processors:

- **Qualcomm(Dimensity 9300)**

Frequency: 3.25GHz

Node : 6nm

- **Mediatek**

→ **Snapdragon 8 Gen 2**

Frequency : 3.2GHz

Node:4nm(TSMCs)

→ Snapdragon 8 Gen 3

Frequency : 3.1GHz

Node:4nm(samsung)

4. What are the different job roles available in vlsi field.

Following are job roles in VLSI field:

1. VLSI Design Engineer
2. Physical Design Engineer
3. ASIC Verification Engineer
4. FPGA Design Engineer
5. Analog/Mixed-Signal Design Engineer
6. DFT (Design for Testability) Engineer
7. STA (Static Timing Analysis) Engineer
8. RTL (Register Transfer Level) Engineer
9. CAD (Computer-Aided Design) Engineer
- 10.Characterization Engineer
- 11.System-on-Chip (SoC) Architect
- 12.VLSI Project Manager

5. Why there is a shift from BJT - MOSFET - FINFET in detail.

BJTs (Bipolar Junction Transistors) were the first type of transistor invented and used in the early days of electronics. It has high power consumption and low input impedance. Later on MOSFETs (Metal-Oxide-Semiconductor Field-Effect Transistors) were introduced as a replacement for BJTs. It has high input impedance and low power dissipation (consumption). It is a voltage-controlled device i.e., it can be turned Off and On by applying voltage to the gate. They are limited in achieving higher speed and emergence of short channel effect. To overcome this FINFET is introduced. FinFETs are new-generation transistors that use a tri-gate structure.

6.Evolution of memory technology.



