UNIT 5: CMOS LOGIC

1. What are the advantages of MOS families over Bipolar families?
2. Compared to the bipolar families, the MOS families are simpler and inexpensive to fabricate, require much less power, have a better noise margin, a greater supply voltage range, a higher fan-out and require much less chip area.
3. What are the disadvantages of MOS families over Bipolar Families?
4. The MOS families are slower in operating speed and are susceptible to static charge damage.
5. Why does the MOS family mostly use NMOS devices?
6. The MOS family mostly uses NMOS devices because they operate at about three times the speed of their PMOS counter parts, and also have twice the packing density of PMOS.
7. Why are MOS IC’s especially sensitive to static charge?
8. MOS IC’s are sensitive to static charge because of the very high impedance at the MOSFET’s input.
9. What are the two types of MOSFETs and which type is used in MOS ICs?
10. The two types of MOSFETs are: (a) depletion type, and (b) enhancement type. The MOS digital ICs use enhancement MOSFETs exclusively.
11. What are the merits and demerits of MOS logic compared to TTL?
12. The MOS logic is the simplest to fabricate and has a high packing density and low power dissipation per gate, but is more susceptible to static charge damage and it is slow compared to TTL.
13. Where are MOS ICs used?
14. MOS ICs are ideally suited for LSI, VLSI, and ULSI for dedicated applications such as large memories, calculator chips, large microprocessors , etc . The operating speed of MOS is slower than that of TTL, so they are hardly used in SSI and MSI applications.
15. What are the Merits and Demerits of CMOS?
16. The Merits and Demerits of CMOS are as follows: The CMOS family has the greatest complexity and lowest packing density, but it possesses the important advantages of higher speed and much lower dissipation.It can be operated at higher voltages resulting in improved noise immunity.
17. Where is CMOS technology used?
18. The CMOS technology is used to construct small, medium and large scale ICs for a wide variety of applications ranging from general purpose logic to microprocessors.
19. Why is the fan out of CMOS very high?
20. The CMOS has very high input resistance. Thus it draws almost zero current from the driving gate, and therefore its fan-out is very high.
21. How do you compare CMOS with TTL?
22. The CMOS fabrication processes is simpler than that of TTL and it has greater packing density. The CMOS uses only a fraction of the power needed even for low power TTL .The CMOS is however generally slower than TTL.
23. For which applications CMOS is ideally suited?
24. The CMOS is ideally suited for applications requiring battery power or battery backup power.
25. Which is the fastest logic family? The slowest logic family?
26. ECL is the fastest logic family and MOS is the slowest logic family.
27. Which logic family is the simplest to fabricate? Most complex to fabricate?
28. MOS logic family is the simplest to fabricate and TTL family is the most complex to fabricate.
29. Which logic family has the highest fan-out? The least fan-out?
30. CMOS family has the highest fan-out and IIL family has the least fan-out.
31. Which logic family has the highest noise margin? The least noise margin?
32. CMOS family has the highest noise margin and ECL family has the least noise margin.
33. When is Dynamic MOS logic selected?
34. When physical size and power consumption are the prime design considerations as in digital watches and calculators, dynamic MOS logic is selected.
35. What are level shifters?
36. Level shifters are specially designed IC’s which are used to make devices from different logic families compatible with each other.
37. What do you mean by interfacing? Why is it required?
38. Interfacing means connecting the output(s) of one circuit or system to the input(s) of another system with different electrical characteristics.

There are number of logic families, each having its own strong points. In designing more complex digital systems , the designers utilize different logic families for different parts of the system in order to take advantage of the strong points of each family. When the designed parts are assembled , since the electrical characteristics of different logic families vary widely, interfacing circuits or logic level translators are used to connect the driver circuit belonging to one family to the load circuit belonging to another family.

1. Which logic family is suitable for SSI and MSI ? For LSI, and VLSI? And for VLSI , and ULSI ?
2. TTL is the most suitable for SSI and MSI. CMOS can also be used for SSI and MSI. MOS is more suitable for LSI, and VLSI. IIL and MOS are suitable for VLSI and ULSI.