UNIT 4: TTL LOGIC

1. What is an IC? Write the classification of IC’s?
2. IC is an electronic circuit in which many circuit elements such as resistors,transistors,diodes and capacitors are fabricated on a single chip.

 IC’s are classified based on scale of integration.

1. Small Scale Integration.
2. Medium Scale Integration.
3. Large Scale Integration.
4. Very Large Scale Integration
5. What are the merits of IC’s?
6. The Merits of IC’s are as follows:

(a)reduces the overall size of the digital system drastically,(b)reduces the cost of the digital system,(c)improves the reliability of the system by reducing the number of external connections from one device to another,and (d)greatly reduces the power consumption of digital systems.

 3. What are the limitations of IC’s?

 A. The limitations of IC’s are as follows:

 (a)IC’s cannot handle large voltages or currents,(b)electrical devices like precision resistors,

 Inductors,transformers and large capacitors cannot be implemented on chips and (c)they are

 mainly suitable for low power applications only.

1. What are the classification of IC’s based on temperature range?
2. There are three different temperature grades based on which the op amp ICs are classified.These temperature ranges are :
3. Militiary Temperature Range: -55C to +85C
4. Industrial Temperature Range: -40C to +85C
5. Commercial Temperature Range: 0C to +75C
6. Which Logic family IC’s have more power dissipation?
7. ECL has more power dissipation. This is because all the transistors are in active mode. Therefore , ECL has more power dissipation. The Typical power dissipation for a basic ECL gate is 40mW.
8. Name the technologies which use unipolar and bipolar transistors?
9. MOS and CMOS technologies are unipolar transistors.TTL,ECL and IIL technologies are bipolar transistors.
10. Define the terms:(a)Threshold Voltage,(b)Propagation delay,(c)power dissipation?
11. (a) The Threshold voltage is defined as that voltage at the input of a gate which causes a change in the state of the output from one logic level to the other.

(b)The Propagation delay of a gate is defined as the time taken by the pulse to propagate from input to output.

(c)The Power dissipation of a gate is defined as the power required by the gate to operate with 50% duty cycle at a specified frequency.

 8. Define (a)fan-in (b)fan-out.

 A. (a) The fan-in of a logic gate is defined as the number of inputs that the gate is desined to

 Handle.

 (b)The fan-out of a logic gate is defined as the maximum number of similar gates that the

 Output of the gate can drive without impairing its normal operation.

1. Define (a)Noise Margin (b)speed power product.
2. (a)The Noise Margin is defined as the maximum noise signal that can be added to the input signal of a digital circuit without causing an undesirable change in the circuit output.

(b)The speed power product of a logic gate is defined as the product of the gate propagation delay and the gate power dissipation.

 10. Name the three types of TTL gates?

 A. The three types of TTL gates are: (a)totem pole type, (b)open collector type, and (c)tri-state

 Type.

1. What are the three possible output states of a tri-state IC?
2. The three possible output states of a tri-state IC are : LOW,HIGH and HIGH IMPEDANCE state.
3. When does a TTL circuit act as a current sink?source?
4. A TTL circuit act as a current sink in the low state and as a current source in the high sate.
5. What do you mean by schottky TTL? Why is it faster than standard TTL?
6. A schottky TTL is one which uses transistors having a schottky barrier diode between the base and collector of each transistor.It is more than three times faster than standard TTL because in this the transistors are not allowed to go fully into saturation and also it uses smaller resistors.
7. Which gates are suitable for wired AND operation?
8. TTL open collector gates are suitable for wired AND operation.

15. What are the Merits and Demerits of TTL ?

A. Good speed, low manufacturing cost, wide range of circuits and the availability in the SSI and

 MSI are the merits of TTL. Tight Vcc tolerance, relatively high power consumption, moderate

 Packing density,generation of noise spikes and susceptibility to power transients are the

 Demerits of TTL.

1. What are the advantages and disadvantages of totem-pole configuration?
2. The Totem-pole configuration has the advantages of high speed and low power dissipation,but the disadvantages of generation of current spikes and the inability to be wire ANDed.
3. What are the characteristics of ECL gates?
4. The important characteristics of ECL gates are: (a)Transistor never saturate so speed is high with tpd=1ns, (b)Logic levels are negative, -0.9 V for logic 1 and -0.17V for logic 0, (c)Noise margin is less, about 250mv. This makes ECL unreliable for use in heavy industrial environment, (d)ECL circuits produce the output and its complement and therefore eliminate the need for inventors, (e)Fan-out is large because the output impedance is low.It is about 25,

(f) Power dissipation per gate is large, Pd=40mW (g) The total current flow in ECL is more or less constant.No noise spikes will be internally generated.

 18. What are the Drawbacks of ECL?

 A. The Drawbacks of ECL are: (a) high cost, (b) low noise margin, (c) high power dissipation, (d)its

 negative supply voltage and logic levels are not compatible with other logic families, and

 (e) problem of cooling.

 19. What are the Merits of ECL?

 A. The Merits of ECL are: (a)The speed of operation is very high, and (b) The current drawn from

 The supply is more steady and they do not experience large switching transients.

 20. Which logic gates are suitable for wired OR operation?

 A. ECL open emitter gates are suitable for wired OR operation.