DEPARTMENT OF TECHNICAL EDUCATION

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Semester : III Semester

Subject : Digital Electronics

Subject Code : EC 303

Sub-Topic : Logic families

DIGITAL LOGIC FAMILY

- Bipolar logic family
  - Saturated
    1. Resistor –Transistor Logic (RTL)
    2. Direct Coupled Transistor Logic (DCTL)
    3. Integrated injection Logic I^2 L
    4. Diode Transistor Logic (DTL)
    5. High Threshold Transistor Logic (HTL)
    6. Transistor – Transistor Logic (TTL)
       - Standard TTL
       - High Power TTL(H)
       - Low Power TTL (L)
       - Low power Schottky(LS)
       - Schottky(S)
  - Non saturated
    - Schottky TTL
    - Emiitter coupled Logic
- Unipolar Logic Family
  - PMOS
  - NMOS
  - CMOS

LOGIC FAMILIES

- A Miniature circuit on the surface of a semi conductor material is a chip.
- The chip is called an Integrated circuit (IC).
- The techniques for manufacturing ICs are bipolar and metal – oxide semiconductor (MOS).
- Bipolar families
  - Diode Transistor Logic.
  - Transistor –Transistor Logic.
  - Emitter –Coupled Logic.

MOS FAMILIES

- p-Channel MOSFETs
- n-Channel MOSFETs
- Complementary MOSFETs

- Bipolar technology is faster , used for SSI & MSI.
- MOS technology is used for LSI.
- A Digital family is a group of compatible devices with same logic levels & supply voltages.

TTL FAMILIES

- Transistor-Transistor logic is a widely used family.
- TTL is fast, in expensive and easy to use.
- Bipolar Transistor Technology is used for MSI & SSI (Medium scale integration and small scale integration).
- Used to build all kinds of digital circuits and systems

CMOS FAMILIES

- Complimentary metal-oxide semiconductor devices are chips.

- They combine p-channel and n-channel MOSFETs.
- They are in push-pull arrangement.
- CMOS Devices have very low power.
- They are used in pocket calculators, watches

ECL DEVICES

- The Emitter Coupled Logic is the fastest of all the logic families.

- ECL is realized using difference amplifier.
- Hence, they are not driven into saturation.
- Are used in applications where very high speed is essential.
- Employ Emitter followers at o/p stage hence high degree of Fan-out.
- Disadvantage is highest power dissipation per gate.