## EC-403 Digital Electronics

**Unit-I**

**Review of Number systems and Binary codes**, Binary arithmetic – addition, subtraction, multiplication and division algorithms. **Boolean algebra**: theorems and functions, Simplification of Boolean functions, minimization techniques, Karnaugh's map method, Quine and McCluskey's method, realization of various binary functions using AND,OR,NOT,XOR logic gates.

**Unit-II**

**Universal gates**: NAND, NOR, realization of boolean function using universal gates. Half and full adder, half and full subtractor, Series and parallel adder, BCD adders, lookahead carry generator. Decoders, Encoders, multiplexers and de-multiplexers. Analysis and design of combination circuits, realization of various Boolean functions using NAND, NOR gates and multiplexers.

**Unit-III**

**Multivibrators**: Astable, Monostable and bistable multivibrators, 555 timer chip and its application in multivibrators.

**Flip-Flops**: R-S, Clocked R-S, T, D, J-K, race around problem, Master-slave J-K., State and Excitation Tables. **Shift registers and counters** :synchronous and asynchronous counters, Binary ripple counter, up-down counter, Johnson and ring counter. Analysis and Design of Sequential Circuits.

**Unit-IV**

**Semiconductor memories**: Organization and construction of RAM, SRAM, DRAM, RAMBUS ROM, PROM, EPROM, EEPROM, PAL and PLAs etc

**Unit-V**

**Logic families**: RTL, DTL, TTL, ECL, IIL, PMOS, NMOS and CMOS logic etc. Interfacing between TTL and MOS, vice-versa.

**References:**

1. M. Mano : Digital Logic and Computer Design, Pearson Education
2. W.H. Gothman : Digital Electronics, PHI.
3. Millman and Taub : Pulse, Digital and Switching Waveforms, MGH
4. Salivahanan and Ari Vahagan : Digital Circuits and Design, Vikas Publishing House
5. Leach and Malvino : Digital Principles and Applications, TMH

**List of Experiments (Expandable):**

All experiments (wherever applicable) should be performed through the following steps.

**Step 1:** Circuit should be designed/drafted on paper.

**Step 2:** The designed/drafted circuit should be tested on the bread board.

**Step 3:** The bread board circuit should be fabricated on PCB by one batch using PCB machine.

1. To test and study of operation of all logic Gates for various IC's.
2. Implementation of AND, OR, NOT, NOR, X-OR and X-NOR Gates by NAND and NOR Universal gates.
3. Binary Addition by Half Adder and Full Adder circuit.
4. Binary Subtraction by Half Subtractor and Full Subtractor circuit.
5. Design a BCD to excess-3 code converter.
6. Verification of the Demorgan's Theorem.
7. Study of RS, JK, T & D flip-flops.
8. Multiplexer/Demultiplexer based boolean function realization.
9. Study and Application of 555 timer (Astable, Monostable, Schmitt trigger, VCO

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