SEMESTER	***DEPARTMENT***	***COURSE TITLE***
Fourth	*General Engineering*	*Digital Electronics I*
COURSE CODE	***HOURS:*** 3	***COURSE SPECIFICATIONS***
ET 406	***UNITS:*** 3	*Theoretical Contents*

1. ***Various Number Systems:***

- Understand different numbering systems: decimal, binary, octal and hexadecimal.
- Conversion between different number systems.
- Perform arithmetic operations in different number systems.

2. ***Types and Functions of Logic Gates:***

- Describe the fundamental operations of: NOT, AND, OR.
- Apply the concept of the truth table.
- Describe logic operations of: NAND, NOR and XOR.
- Implement simple Boolean functions with logic gates.

3. ***Basic Theorems of Boolean Algebra, and Minimize Functions Using a Karnaugh Map:***

- Define and use basic theorems of Boolean algebra.
- Use the concept of minterms and maxterms as applied to Boolean algebra.
- Represent logic functions using a Karnaugh map, using two and three-variable Karnaugh maps.
- Minimize Boolean functions in sum of products and product of sums.
- Implement Boolean functions with: NAND gates only and NOR gates only.
- Use the four variable Karnaugh map.
- Implement the minimization of Boolean functions with don't-care conditions.

4. ***Combinational Logic Circuits*:**

- Design procedure.
- Adders.
- Subtractors.

- Code conversion.

5. *Describe the Function of Sequential Logic Elements and Circuits*:

- Concept of synchronous and asynchronous sequential circuits.
- Describe the function of the basic SR, D, T, and JK types of flip-flop and define their truth tables.
- Concept of ripple counters and their disadvantages in a large system.
- Explain the concept of synchronous counters and appreciate the function of some examples. (binary up-down and BCD).
- Appreciate the various types of register.

6. Appreciate Logic Families and Their Characteristics:

- Explain the different type of logic sub-families in the TTL 74xx series; e.g.: LS, F, HC, HCT.
- Characteristics of digital logic gates including fan-in, fan-out, power dissipation, voltages, currents, noise margin and propagation delay.
- TTL chip output and their purpose; e.g.: totem pole, Schmitt, open collector, buffer/driver.

References:

1. Thomas P. Sitterlen and Vartan Vartanian, ***Digital Electronics with Engineering Applications,*** Prentice Hall.
2. Fred Hilsenrath and Bill Pierce, ***Digital Logic Circuits and Systems***, Delmar Publishers Inc.
3. M. Morris Mano, ***Digital Design***, Prentice Hall, 1991.
4. Ronald J. Tocci and Lester P. Laskowski, ***Microprocessor and Microcomputers, Hardware and Software***, Prentice Hall.