**20XC14 DIGITAL SYSTEM DESIGN 3 2 0 4**

**INTRODUCTION**: Basic principles of System Design -Building blocks for Computer Systems; CPU, Storage, I/O, Multimedia devices - Functional components of a computer system- Workstations, Servers - Interaction among functional components. (4)

**NUMBER REPRESENTATION:** Binary - Octal - Hexadecimal - BCD - excess three - Gray codes - Error correcting and detecting codes - Representation of signed numbers – arithmetic operation on signed numbers - Alphanumeric data representation. (5)

**BOOLEAN ALGEBRA AND LOGIC GATES:** Boolean relations - Laws and theorems - AND, OR, NOT, NAND and NOR gates - exclusive OR gates - Positive and negative logic systems - Simplifications - Karnaugh maps and simplifications - Don’t care conditions - NAND-NAND realizations-PAL and PLA Logics (8)

**DESIGN OF ARITHMETIC AND LOGIC UNIT**: Combinational logic circuits – Encoder, Decoder, Multiplexer and Demultiplexer -Representation of integer data, Integer adders, Integer multipliers, Design of integer unit- floating point representation of real data-IEEE representation Floating-point adder/subtractor- Floating-point multiplier, Design of Floating point unit- design of ALU (10)

**DESIGN OF REGISTERS AND MEMORY UNIT**: Flip-flops, Synchronous sequential circuits – Registers and Counters; Memory unit construction – State Machine Design - State machine as a sequential controller; Moore and Mealy state machines; Derivation of state graph and tables; Sequence detector (8)

**PROGRAM EXECUTION :** Processing of High Level Language Code:- Assembler- Code generation,-Application binary interface-Interpreter - simple compiler - Instruction set architecture of a simple CPU, Micro architecture of CPU, Generation and Execution of machine code- The hardware-software interface -Hardware features influenced by software requirements - Specifications of the performance of a system (10)

**Total L:45+30=75**

**TUTORIAL PRACTICE**

1. Study of basic logic gates and realization of logic gates using universal gates.

2. Multiplexer and Demultiplexer.

3. Half and full adder / subtractor.

4. Encoder and decoder.

5. Binary counter.

6. BCD to seven segment decoder.

7. Study of D/A converter.

**TEXT BOOKS:**

1. C.H. Roth and L.L.Kinney, “Fundamentals of Logic Design”, Cengage Learning, 2014

2. William Stallings, “Computer Architecture and Organization Designing for Performance”, Pearson Education, 2014.

3. David A. Patterson, John L. Hennessy, “Computer Organization and Design: The Hardware/Software Interface”, Morgan Kaufmann, 2013.

4. C.Hamacher, Z.Vranesic, S.Zaky and N.Manjikian, “Computer Organization and Embedded Systems”, McGraw-Hill, 2012.

5. N. Nisan and S. Schocken, “The Elements of Computing Systems – Building a Modern Computer from First Principles”, The MIT Press, 2005.

**REFERENCES:**

**1.** Mano M.M, "Computer System Architecture", Pearson Education, 2017

**2.** S. Brown, Z Vranesic, “Fundamentals of Digital Logic with VHDL Design”, McGraw-Hill Education, 2009