## SEM V EComE

## Syllabus

**Course Name: Machine Learning** **[2:0:2=3]**

**Course Content**

Foundations of Artificial Intelligence (AI) - Overview and Types, Applications of Artificial Intelligence, Sub-fields of AI, Problem-solving as State-space search, Uninformed search algorithms, Heuristic searching techniques, including A*, Constraint Satisfaction Problems, Intelligent Agents – Components and Types of Agents, Introduction to Expert Systems - Knowledge representation with Rule-based Systems and Semantic Net, Handling imprecision in data, Introduction to Fuzzy Logic and Fuzzy sets. Introduction to Machine Learning: Overview and Types, Applications, Essential Libraries and Tools, Role of Statistics, Regression: Multi Linear and Logistic regression, Supervised Learning – Support vector Machine – hard & soft margin, Gradient Descent, Decision Trees, Ensemble learning, Bagging, Boosting, Random Forest, Introduction to Neural Network, Perceptron's – The Perceptron, Multi-Layer Perceptron, Artificial neural Network, Unsupervised Learning – Clustering and its Types, Clustering – K- Means, DBSCAN. Dimensionality Reduction - Subset Selection, Principal Component Analysis.

**Course Outcomes**

**CO1:** Understand different types of machine learning techniques and their applications.

**CO2:** Apply different machine learning algorithms for solving classification, and regression using feature engineering and feature selection.

**CO3:** Analyse real-world problems and design appropriate machine learning models.

**Textbook:**


1) Sinan Ozdemir. Principles of Data Science: Learn the techniques and math you need to start making sense of your data. Packt Publishing.
2) Davis, Glyn, and Pecar, Branko. Business Statistics Using Excel. Oxford University Press.

## Course Name: Microprocessors and Microcontrollers [2:0:2=3]

**Course Content**

**Unit 1:** Introduction to microprocessors: Number system, what is computing systems and its applications? Components of a computer system, Types of memories and memory interfacing problems, what are registers and how they are implemented, basic internal architecture of a microprocessor processor, difference between microcontroller and microprocessor.

**Unit 2:** Introduction to 8085 Microprocessor: Architecture, Pin diagram and its operation, quick discussion on instruction set and its use in assembly programming. Instruction classification: Assembly language instructions, Instruction data format and storage, How to write, assemble and execute a simple program, addressing modes, Counters, calculations of time delays, understanding stacks and subroutines

**Unit 3:** 8086 processor: Introduction to 8086 microprocessor, Architecture and pin diagram. Addressing modes. Instruction set of 8086: Data transfer and arithmetic instructions. Control/Branch Instructions, Illustration of these instructions with example programs. Logical Instructions, String manipulation instructions, Flag manipulation and Processor control instructions, Illustration of these instructions with example programs. Assembler Directives and Operators, Assembly Language Programming and example programs.

**Unit 4:** Interrupts of 8085 and 8086: Memory interfacing, Memory address decoding, Memory banks, I/O address decoding. Interrupts of 8085, Interfacing of 8085 with RAM, ROM, 8255, 8254, 8279, 8259, 8251. Hands on experiment on designing simple applications using peripheral chips and 8085 and 8086 microprocessors.

**Unit 5:** 8086 Bus Configuration and Timings: Physical memory Organization, General Bus operation cycle, I/O addressing capability, Special processor activities, Minimum mode 8086 system and Timing diagrams, Maximum and Minimum Mode 8086 system and Timing diagrams

**Course Outcomes:**

**CO1:** Understanding microprocessor functionality and memory interfacing and it management

**CO2:** Able to interface external peripheral chips such as 8255, 8257, 8259, 8251 and design simple applications using 8085 and 8086 microprocessor

**CO3:** Able to write assembly programming

**Text Book:**

**1)** 8085 AND 8086 BY Ramesh GAONKER
**2)** 8085 AND 8086 DATASHEETS

## Course Name: Digital VLSI Design [2:0:2=3]

**Course Content**

Introduction to VLSI Design, Overview of VLSI Design Methodologies, VLSI Design Flow, Design Hierarchy, Concepts of Regularity, Modularity and Locality, VLSI Design Styles, Quality Metrics, Packaging, Levels of abstraction and the complexity of design, Challenges of VLSI design: power, timing, area, noise, testability, reliability and yield CAD tools: simulation, layout, synthesis, testing. Introduction to VLSI Technology and VLSI fabrication principles, Layout design, Design rules, Stick diagrams, MOS Transistors, MOS modeling, Short-channel effects and velocity saturation, Scaling of MOS circuits, MOS device models, MOS Inverters: Static Characteristics Resistive Load Inverter, The CMOS inverter, VTC, Noise margins and power dissipation, MOS Inverters: Switching Characteristics RC interconnect modeling, Driving large capacitive load, reducing RC delays, MOS combinational logic circuits: CMOS logic circuits, Complex logic circuits, CMOS Transmission Gates, Complementary Pass Transistor Logic, Transistor sizing in static CMOS, logical effort, Pass-transistor logic, sizing issues.

Sequential Logic Circuits: Introduction, Static Latches and Registers, Dynamic Latches and registers, Pipelining. Timing issues in Digital Circuits: Timing classification of digital systems, Synchronous Design Timing basics, clock skew, clock jitter and their combine impact. Dynamic Logic Circuits: Pass Transistor Circuits, Voltage Bootstrapping, Synchronous Dynamic Logic, Dynamic CMOS Logic, High Performance Dynamic CMOS Circuits, Domino CMOS logic, NP-Domino Logic, Zipper CMOS Circuits, TSPC Dynamic CMOS MOS memories: Introduction, DRAM, SRAM, Non-volatile Memory, Flash Memory, Designing Arithmetic Building Blocks

**Course Outcomes**

**CO1:** Understand the design of digital integrated circuits, MOS fundamentals and MOS models and analysis of MOSFET based digital circuits.

**CO2:** Synthesize and Analyze the MOS inverters, combinational circuits, sequential circuits dynamic logic circuits and MOS memories.

**CO3:** Solve practical and state of the art digital IC design problems to serve VLSI industries.

**Textbook:**


**1)** Sung-Mo Kang, Yusuf Leblebici, “CMOS Digital Integrated Circuits”, TMH , 2014

**2)** J.M Rabaey, A. Chandrakasan, B.Nikolic, “Digital Integrated Circuits: A Design Perspective”, Pearson , 2012

**3)** Kamran Eshraghian and Neil Weste, “Principles of CMOS VLSI Design: A Systems Perspective”, Pearson.

**Course Name: Computer Organisation & Architecture** **[2:0:2=3]**

**Course Content**

Introduction: Function and structure of a computer, Functional components of a computer, Interconnection of components, Performance of a computer. Instruction Set Architecture: Representation of Instructions: Machine instructions, Operands, Addressing modes, Instruction formats, Instruction sets, Instruction set architectures - CISC and RISC architectures, Processing Unit: Organization of a processor - Registers, ALU and Control unit, Data path in a CPU, Instruction cycle, Organization of a control unit - Operations of a control unit, Hardwired control unit, Microprogrammed control unit, Introduction to parallel processing systems, Flynn's classifications, pipeline processing, Instruction pipelining, pipeline stages and Pipeline hazards. Flynn's classification and introduction to multi-sore processing. Memory Subsystem: Semiconductor memories, Memory cells - SRAM and DRAM cells, Internal Organization of a memory chip, Organization of a memory unit, Error correction memories, Interleaved memories, Cache memory unit - Concept of cache memory, Mapping methods, Organization of a cache memory unit, Fetch and write mechanisms, Memory management unit - Concept of virtual memory, Address translation, Hardware support for memory management.

**Course Outcomes:**

**CO1:** Understand the functional units of the processors and corresponding instruction set architecture

**CO2:** Design the computer systems consisting of processing unit, I/O devices and memory subsystem for solving realistic problems.

**CO3:** Analyze the performance of given systems in terms of data transfer rate, processing speed, density, cost etc.

**Text Book:**


1) William Stallings, "Computer Organization and Architecture – Designing for Performance", Latest edition.
2) Hennessy, J. L., and D. A. Patterson. Computer Architecture: A Quantitative
3) Approach, 3rd ed. San Mateo, CA: Morgan Kaufman, 2002.
4) M Morris Mano and Rajib Mall, "Computer System Architecture", Third Revised Edition, Pearson.