## EC8552 COMPUTER ARCHITECTURE AND ORGANIZATION

### OBJECTIVES:

- To make students understand the basic structure and operation of digital computer
- To familiarize with implementation of fixed point and floating-point arithmetic operations
- To study the design of data path unit and control unit for processor
- To understand the concept of various memories and interfacing
- To introduce the parallel processing technique

### UNIT I COMPUTER ORGANIZATION & INSTRUCTIONS

Basics of a computer system: Evolution, Ideas, Technology, Performance, Power wall, Uniprocessors to Multiprocessors. Addressing and addressing modes. Instructions: Operations and Operands, Representing instructions, Logical operations, control operations.

### UNIT II ARITHMETIC

Fixed point Addition, Subtraction, Multiplication and Division. Floating Point arithmetic, High performance arithmetic, Subword parallelism

### UNIT III THE PROCESSOR

Introduction, Logic Design Conventions, Building a Datapath - A Simple Implementation scheme - An Overview of Pipelining - Pipelined Datapath and Control. Data Hazards: Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions.

### UNIT IV MEMORY AND I/O ORGANIZATION

Memory hierarchy, Memory Chip Organization, Cache memory, Virtual memory. Parallel Bus Architectures, Internal Communication Methodologies, Serial Bus Architectures, Mass storage, Input and Output Devices.

### UNIT V ADVANCED COMPUTER ARCHITECTURE

Parallel processing architectures and challenges, Hardware multithreading, Multicore and shared memory multiprocessors, Introduction to Graphics Processing Units, Clusters and Warehouse scale computers - Introduction to Multiprocessor network topologies.

**TEXT BOOKS:**

1. David A. Patterson and John L. Hennessey, —Computer Organization and Design‖, Fifth edition, Morgan Kauffman / Elsevier, 2014. (UNIT I-V)

2. Miles J. Murdocca and Vincent P. Heuring, —Computer Architecture and Organization: An Integrated approach‖, Second edition, Wiley India Pvt Ltd, 2015 (UNIT IV, V)

**REFERENCES**

1. V. Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, —Computer Organization—, Fifth edition, Mc Graw-Hill Education India Pvt Ltd, 2014.

2. William Stallings —Computer Organization and Architecture‖, Seventh Edition, Pearson Education, 2006.

3. Govindarajalu, —Computer Architecture and Organization, Design Principles and Applications", Second edition, McGraw-Hill Education India Pvt Ltd, 2014.