



## GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY COMPUTER ORGANIZATION

**Course Code: GR22A2073**  
**II Year II Semester**

**L/T/P/C: 3/0/0/3**

### **Course Outcomes:**

1. Demonstrate knowledge of register organization of a basic computer system
2. Incorporate In-depth understanding of control unit organization and microprogrammed control.
3. Understand the performance of central processing unit of a basic computer system.
4. Apply various algorithms to perform arithmetic operations and propose suitable hardware and appraise various methods of communications with I/O devices.
5. Analyze and emphasize various communication media in the basic computer system using design of various memory structures and Multiprocessor systems.

### **UNIT I**

**Basic Structure of Computers:** Computer Types, Functional unit, Data Representation, Fixed Point Representation, Floating – Point Representation, Error Detection codes.

**Register Transfer Language and Micro operations:** Register Transfer language. Register Transfer, Bus and memory transfers, Micro Operations and its types, Arithmetic logic shift unit.

### **UNIT II**

**Basic Computer Organization and Design:** Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt, Complete Computer Description.

**Micro Programmed Control:** Control memory, Address sequencing, Micro program example, Design of control unit, Micro program Sequencer, Hard wired control Vs Micro programmed control.

### **UNIT III**

**Central Processing Unit Organization:** General Register Organization, STACK organization. Instruction formats, Addressing modes. DATA Transfer and manipulation, Program control. Reduced Instruction set computer.

**Computer Arithmetic:** Addition and subtraction, multiplication Algorithms, Floating – point Arithmetic operations, BCD Adder.

### **UNIT IV**

**Input-Output Organization:** Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP).

**Pipeline and Vector Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Dependencies, Vector Processing.

### **UNIT V**

**Memory Organization:** Memory Hierarchy, Main memory- RAM and ROM chips, Memory Address map, Auxiliary memory – Magnetic Disks, Magnetic Tapes, Associative Memory – Hardware Organization, Match Logic, Cache Memory – Associative mapping, Direct mapping, Set associative mapping, Writing into cache and cache initialization, Cache Coherence, Virtual memory – Address Space and Memory Space, Address mapping using



pages, Associative Memory page table, Page Replacement.

**Multi Processors:** Characteristics or Multiprocessors, Interconnection Structures, Cache Coherence, Shared Memory Multiprocessors.

**Teaching Methodologies:**

- Power Point Presentations
- Tutorial Sheets
- Assignments

**Text Books:**

1. Computer Systems Architecture – M.Moris Mano, 3<sup>rd</sup> Edition, Pearson/PHI
2. Computer Organization – Carl Hamacher, ZvonksVranesic, SafeaZaky, 5<sup>th</sup> Edition, McGraw Hill.

**References:**

1. Computer Organization and Architecture – William Stallings 7<sup>th</sup> Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 6<sup>th</sup> Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - SivaraamaDandamudi SpringerInt. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, 5<sup>th</sup> Edition Elsevier
5. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.