



# SILVER OAK UNIVERSITY

## Computer Application

Integrated M.Sc(IT)

Subject Name: Computer Organization

Subject Code:

Semester: I

**Prerequisite:** Basic Knowledge of Digital Electronics

**Objective:** This course intends to make student understand the structure, function and characteristics of computer systems. Students will understand the design of the various functional units and components of computers. This will help them to identify the elements of modern instructions sets and their impact on processor design. This course will also expose students to the basic architecture of processing, memory and I/O organization in a computer system.

### Teaching and Examination Scheme:

Teaching Scheme			Credits C	Evaluation Scheme				Total Marks
L	T	P		Internal		External		
				Th	Pr	Th	Pr	
4	0	2	5	40	20	60	30	150

### Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	<b>Computer Data Representation:</b> Basic computer data types, Complements, Fixed point representation, Floating point representation,	3	6
2	<b>Overview of register transfer and micro operations:</b> Register Transfer language, Register Transfer, Bus and Memory Transfers (Tree-State Bus Buffers, Memory Transfer), Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logical shift unit	3	6
3	<b>Basic Computer Organization and Design:</b> Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, Complete computer description, Design of Basic computer, Design of Accumulator Unit.	5	10
4	<b>Micro programmed Control Organization:</b> Control Memory, Address sequencing, Micro program example, Design of Control Unit	5	10

5	<b>Central Processing Unit:</b> Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes, Data transfer and manipulation, Program control, Reduced Instruction Set Computer (RISC) & Complex Instruction Set Computer (CISC)	7	12
6	<b>Pipeline And Vector Processing:</b> Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline, RISC Pipeline, Vector Processing, Array Processors	7	12
7	<b>Computer Arithmetic:</b> Introduction, Addition and subtraction, Multiplication Algorithms (Booth Multiplication Algorithm), Division Algorithms, Floating Point Arithmetic operations, Decimal Arithmetic Unit.	5	10
8	<b>Input-Output Organization:</b> Input-Output Interface, Asynchronous Data Transfer, Modes Of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPU IOP Communication, Serial communication.	5	10
9	<b>Memory Organization:</b> Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.	7	14
10	<b>Multiprocessors:</b> Characteristics of Multiprocessors, Interconnection Structures, Inter-processor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence, Shared Memory Multiprocessors.	5	10

### Course Outcome:

Sr. No.	CO statement	Unit No
CO-1	Identify and explain the basic structure and functional units of a digital computer.	1,2
CO-2	Identify the role and working of various functional units of a computer for executing an instructions.	3
CO-3	Design processing unit using the concepts of ALU and control logic design.	4,5
CO-4	Design circuits for interfacing memory and I/O with processor.	6,7,8,9
CO-5	Comprehend the features and performance parameters of different types of computer architectures.	10

### List of Experiments/Tutorials:

Sr. No.	Practical Title
1	Implement Booth's Algorithm
2	Write the working of 8085 simulator GNUsim8085 and basic architecture of 8085 along with small introduction.
3	Write an assembly language code in GNUsim8085 to store numbers in reverse order in memory location.

4	Write an assembly language code in GNUsim8085 to implement arithmetic instruction
5	Write an assembly language code in GNUsim8085 to find the factorial of a number. C
6	Write an assembly language code in GNUsim8085 to implement logical instructions.
7	Design ALU using Logisim.

**Major Equipment:**

Computer System with 8085 simulator and Logisim software

**Books Recommended:-**

1. M. Morris Mano, "Computer System Architecture", Pearson Education
2. Yale N. Patt, Sanjay J. Patel, "Introduction to Computing Systems" McGraw Hill.
3. Hamacher, Vranesic, Zaky, "Computer Organization", McGraw Hill.
4. Andrew S. Tanenbaum and Todd Austin, "Structured Computer Organization", Pearson Education
5. N. D. Jotwani, "Computer system organization", McGraw Hill
6. R.S.Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085A", Penram International
7. Douglas Hall, Microprocessors and Interfacing, TMH.

**List of Open Source Software/learning website:**

1. <https://nptel.ac.in/courses/106/105/106105163/>
2. <https://nptel.ac.in/courses/106/103/106103068/>
3. [https://onlinecourses.nptel.ac.in/noc20\\_cs64/](https://onlinecourses.nptel.ac.in/noc20_cs64/)
4. <https://swayam.gov.in/>
5. <https://www.tutorialspoint.com/microprocessor/>
6. <https://www.geeksforgeeks.org/data-transfer-instructions-8086-microprocessor/>