

COMPUTER ORGANIZATION AND ARCHITECTURE			
Course Code	21CS34	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Course Learning Objectives			
CLO 1. Understand the organization and architecture of computer systems, their structure and operation			
CLO 2. Illustrate the concept of machine instructions and programs			
CLO 3. Demonstrate different ways of communicating with I/O devices			
CLO 4. Describe different types memory devices and their functions			
CLO 5. Explain arithmetic and logical operations with different data types			
CLO 6. Demonstrate processing unit with parallel processing and pipeline architecture			
Teaching-Learning Process (General Instructions)			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.			
2. Use of Video/Animation to explain functioning of various concepts.			
3. Encourage collaborative (Group Learning) Learning in the class.			
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.			
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.			
6. Introduce Topics in manifold representations.			
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.			
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.			
Module-1			
Basic Structure of Computers: Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement.			
Machine Instructions and Programs: Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes			
Textbook 1: Chapter1 – 1.3, 1.4, 1.6 (1.6.1-1.6.4, 1.6.7), Chapter2 – 2.2 to 2.5			
Teaching-Learning Process	Chalk and board, Active Learning, Problem based learning		
Module-2			
Input/Output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Direct Memory Access, Buses, Interface Circuits			
Textbook 1: Chapter4 – 4.1, 4.2, 4.4, 4.5, 4.6			
Teaching-Learning Process	Chalk and board, Active Learning, Demonstration		
Module-3			
Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Virtual memories			
Textbook 1: Chapter 5 – 5.1 to 5.4, 5.5 (5.5.1, 5.5.2)			
Teaching-Learning Process	Chalk and board, Problem based learning, Demonstration		

Module-4

Arithmetic: Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers

Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Hardwired control, Microprogrammed control

Textbook 1: Chapter 2-2.1, Chapter 6 - 6.1 to 6.3

Textbook 1: Chapter 7 - 7.1, 7.2, 7.4, 7.5

Teaching-Learning Process	Chalk & board, Problem based learning
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Module-5

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Vector Processing, Array Processors

Textbook 2: Chapter 9 - 9.1, 9.2, 9.3, 9.4, 9.6, 9.7

Teaching-Learning Process	Chalk and board, MOOC
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Course Outcomes

At the end of the course the student will be able to:

- CO 1. Explain the organization and architecture of computer systems with machine instructions and programs
- CO 2. Analyze the input/output devices communicating with computer system
- CO 3. Demonstrate the functions of different types of memory devices
- CO 4. Apply different data types on simple arithmetic and logical unit
- CO 5. Analyze the functions of basic processing unit, Parallel processing and pipelining

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of 10 Marks

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

The students have to answer 5 full questions, selecting one full question from each module

Textbooks

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill
2. M. Morris Mano, Computer System Architecture, PHI, 3rd Edition

Reference:


1. William Stallings: Computer Organization & Architecture, 9th Edition, Pearson

Weblinks and Video Lectures (e-Resources):

1. <https://nptel.ac.in/courses/106/103/106103068/>
2. <https://nptel.ac.in/content/storage2/courses/106103068/pdf/coa.pdf>
3. <https://nptel.ac.in/courses/106/105/106105163/>
4. <https://nptel.ac.in/courses/106/106/106106092/>
5. <https://nptel.ac.in/courses/106/106/106106166/>
6. <http://www.nptelvideos.in/2012/11/computer-organization.html>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Discussion and literature survey on real world use cases
- Quizzes


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