

## COMPUTER ORGANIZATION AND ARCHITECTURE

IV Semester: CSE / IT																										
Course Code	Category	Hours / Week			Credits	Maximum Marks																				
ACSB07	Core	L	T	P	C	CIA	SEE	Total																		
		3	-	-	3	30	70	100																		
<b>Contact Classes: 45</b>		<b>Tutorial Classes: Nil</b>		<b>Practical Classes: Nil</b>			<b>Total Classes: 45</b>																			
<p><b>I. COURSE OVERVIEW:</b>            This course intended to provide the structure, internal working and implementation of a computer system. The fundamentals of various functional units of computer, computer instructions, addressing modes, computer arithmetic and logic unit, registers, data transfer, memory and input output system. It focuses on analysis of computer performance and functioning in modern computers.</p> <p><b>II. OBJECTIVES:</b>  <b>The course should enable the students to:</b></p> <ul style="list-style-type: none"> <li>I The basic concepts of the various functional units and characteristics of computersystems.</li> <li>II The concepts of central processing unit design and perform basic operations withsigned and unsigned integers in decimal and binary number systems.</li> <li>III The function of each element of a memory hierarchy and compare the different methodsfor computer input and output.</li> </ul> <p><b>III. COURSE OUTCOMES:</b>  <b>After successful completion of the course, students should be able to:</b></p> <ul style="list-style-type: none"> <li>CO 1 <b>Illustrate interaction of components in a computer system withfunctional units and</b> Understand <b>levels of programming languages.</b></li> <li>CO 2 <b>Demonstrate the implementation of micro-operations with thehelp of register transfer</b> Understand <b>language and electronic circuits.</b></li> <li>CO 3 <b>Identify appropriate addressing modes for specifying thelocation of an operand.</b> Apply</li> <li>CO 4 <b>Make use of number system for data representation andbinary arithmetic in digital</b> Apply <b>computers.</b></li> <li>CO 5 <b>Interpret the design of hardwired and micro-programmedcontrol unit for execution of</b> Understand <b>micro programs.</b></li> <li>CO 6 <b>Summarize the concepts of pipelining and inter processcommunication for advanced</b> Understand <b>processor design.</b></li> </ul> <p><b>IV. SYLLABUS:</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><b>MODULE - I</b></td> <td style="width: 60%;"><b>INTRODUCTION TO COMPUTER ORGANIZATION</b></td> <td style="width: 25%;"><b>Classes: 08</b></td> </tr> <tr> <td colspan="3">Basic computer organization, CPU organization, memory subsystem organization and interfacing, input or output subsystem organization and interfacing, a simple computer levels of programming languages, assembly language instructions, instruction set architecture design, a simple instruction set architecture.</td> </tr> <tr> <td><b>MODULE -II</b></td> <td><b>ORGANIZATION OF A COMPUTER</b></td> <td><b>Classes: 10</b></td> </tr> <tr> <td colspan="3">Register transfer: Register transfer language, register transfer, bus and memory transfers, arithmetic micro operations, logic micro operations, shift micro operations; Control unit: Control memory, address sequencing, micro program example, and design of control unit.</td> </tr> <tr> <td><b>MODULE -III</b></td> <td><b>CPU AND COMPUTER ARITHMETIC</b></td> <td><b>Classes: 08</b></td> </tr> <tr> <td colspan="3">CPU design: Instruction cycle, data representation, memory reference instructions, input-output, and interrupt, addressing modes, data transfer and manipulation, program control. Computer arithmetic: Addition and subtraction, floating point arithmetic operations, decimal arithmetic unit.</td> </tr> </table>									<b>MODULE - I</b>	<b>INTRODUCTION TO COMPUTER ORGANIZATION</b>	<b>Classes: 08</b>	Basic computer organization, CPU organization, memory subsystem organization and interfacing, input or output subsystem organization and interfacing, a simple computer levels of programming languages, assembly language instructions, instruction set architecture design, a simple instruction set architecture.			<b>MODULE -II</b>	<b>ORGANIZATION OF A COMPUTER</b>	<b>Classes: 10</b>	Register transfer: Register transfer language, register transfer, bus and memory transfers, arithmetic micro operations, logic micro operations, shift micro operations; Control unit: Control memory, address sequencing, micro program example, and design of control unit.			<b>MODULE -III</b>	<b>CPU AND COMPUTER ARITHMETIC</b>	<b>Classes: 08</b>	CPU design: Instruction cycle, data representation, memory reference instructions, input-output, and interrupt, addressing modes, data transfer and manipulation, program control. Computer arithmetic: Addition and subtraction, floating point arithmetic operations, decimal arithmetic unit.		
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<b>MODULE -IV</b>	<b>INPUT-OUTPUT ORGANIZATION AND MEMORY ORGANIZATION</b>	<b>Classes: 10</b>
Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory; Input or output organization: Input or output Interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access.		
<b>MODULE -V</b>	<b>MULTIPROCESSORS</b>	<b>Classes: 09</b>
Pipeline: Parallel processing, pipelining-arithmetic pipeline, instruction pipeline; Multiprocessors: Characteristics of multiprocessors, inter connection structures, inter processor arbitration, inter processor communication and synchronization.		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. M. Morris Mano, "Computer Systems Architecture", Pearson, 3<sup>rd</sup> Edition, 2015.</li> <li>2. John D. Carpinelli, "Computer Systems Organization and Architecture", Pearson, 1<sup>st</sup> Edition, 2001.</li> <li>3. Patterson, Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Morgan Kaufmann, 5<sup>th</sup> Edition, 2013.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. John. P. Hayes, "Computer System Architecture", McGraw-Hill, 3<sup>rd</sup> Edition, 1998.</li> <li>2. Carl Hamacher, Zvonko G Vranesic, Safwat G Zaky, "Computer Organization", McGraw-Hill, 5<sup>th</sup> Edition, 2002.</li> <li>3. William Stallings, "Computer Organization and Architecture", Pearson Edition, 8<sup>th</sup> Edition, 2010.</li> </ol>		
<b>Web References:</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://www.tutorialspoint.com/computer_logical_organization/">https://www.tutorialspoint.com/computer_logical_organization/</a></li> <li>2. <a href="https://www.courseera.org/learn/comparch">https://www.courseera.org/learn/comparch</a></li> <li>3. <a href="https://www.cssimplified.com/.../computer-organization-and-assembly-language-programming">https://www.cssimplified.com/.../computer-organization-and-assembly-language-programming</a></li> </ol>		
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<ol style="list-style-type: none"> <li>1. <a href="https://www.groupe.polymtl.ca/inf2610/.../ComputerSystemBook.pdf">https://www.groupe.polymtl.ca/inf2610/.../ComputerSystemBook.pdf</a></li> <li>2. <a href="https://www.cse.hcmut.edu.vn/~vtphuong/KTMT/Slides/TextBookFull.pdf">https://www.cse.hcmut.edu.vn/~vtphuong/KTMT/Slides/TextBookFull.pdf</a></li> </ol>		