

Course code	Course Name	L-T-P - Credits	Year of Introduction
EC206	COMPUTER ORGANISATION	3-0-0-3	2016
<b>Prerequisite:</b> EC207 Logic Circuit Design			
<b>Course Objectives</b>			
<ul style="list-style-type: none"> <li>To impart knowledge in computer architecture.</li> <li>To impart knowledge in machine language programming.</li> <li>To develop understanding on I/O accessing techniques and memory structures.</li> </ul>			
<b>Syllabus</b>			
Functional units of a computer, Arithmetic circuits, Processor architecture, Instructions and addressing modes, Execution of program, Micro architecture design process, Design of data path and control units, I/O accessing techniques, Memory concepts, Memory interface, Cache and Virtual memory concepts.			
<b>Expected outcome .</b>			
The students will be able to:			
<ol style="list-style-type: none"> <li>Understand the functional units of a computer</li> <li>Identify the different types of instructions</li> <li>Understand the various addressing modes</li> <li>Understand the I/O addressing system</li> <li>Categorize the different types of memories</li> </ol>			
<b>Text Book:</b>			
<ol style="list-style-type: none"> <li>David A. Patterson and John L. Hennessey, Computer Organisation and Design, Fourth Edition, Morgan Kaufmann</li> <li>David Money Harris, Sarah L Harris, Digital Design and Computer Architecture, Morgan Kaufmann – Elsevier, 2009</li> </ol>			
<b>References:</b>			
<ol style="list-style-type: none"> <li>Carl Hamacher : “Computer Organization ”, Fifth Edition, Mc Graw Hill</li> <li>John P Hayes: “Computer Architecture and Organisation”, Mc Graw Hill</li> <li>William Stallings: “Computer Organisation and Architecture”, Pearson Education</li> <li>Andrew S Tanenbaum: “Structured Computer Organisation”, Pearson Education</li> <li>Craig Zacker: “PC Hardware : The Complete Reference”, TMH</li> </ol>			
<b>Course Plan</b>			
Module	Contents	Hours	Sem. Exam Marks
<b>I</b>	Functional units of a computer Arithmetic Circuits: Adder-carry propagate adder, Ripple carry adder, Basics of carry look ahead and prefix adder, Subtractor, Comparator, ALU	4	15%
	Shifters and rotators, Multiplication, Division	3	
	Number System: Review of Fixed point & Floating point number system	1	
<b>II</b>	Architecture : Assembly Language, Instructions, Operands, Registers, Register set, Memory, Constants	2	15%
	Machine Language: R-Type, I-Type, J-Type Instructions, Interpreting machine language code	3	
<b>FIRST INTERNAL EXAMINATION</b>			
<b>III</b>	<b>MIPS</b> Addressing modes – Register only, Immediate, Base, PC-relative, Pseudo - direct	3	15%

	MIPS memory map, Steps for executing a program - Compilation, Assembling, Linking, Loading	3	
	Pseudoinstructions, Exceptions, Signed and Unsigned instructions, Floating point instructions	3	
IV	MIPS Microarchitectures – State elements of MIPS processor	1	15%
	Design process and performance analysis of Single cycle processor, Single cycle data path, Single cycle control for R – type arithmetic/logical instructions.	3	
	Design process and performance analysis of multi cycle processor, Multi cycle data path, Multi cycle control for R – type arithmetic/logical instructions.	3	
<b>SECOND INTERNAL EXAMINATION</b>			
V	I/O system – Accessing I/O devices, Modes of data transfer, Programmed I/O, Interrupt driven I/O, Direct Memory Access, Standard I/O interfaces – Serial port, Parallel port, PCI, SCSI, and USB.	3	20%
	Memory system – Hierarchy, Characteristics and Performance analysis, Semiconductor memories (RAM, ROM, EPROM), Memory Cells – SRAM and DRAM, internal organization of a memory chip, Organization of a memory unit.	4	
VI	Cache Memory – Concept/principle of cache memory, Cache size, mapping methods – direct, associated, set associated, Replacement algorithms, Write policy- Write through, Write back.	3	20%
	Virtual Memory – Memory management, Segmentation, Paging, Address translation, Page table, Translation look aside buffer.	3	
<b>END SEMESTER EXAM</b>			

### Question Paper Pattern

The question paper shall consist of three parts. Part A covers I and II module, Part B covers III and IV module, Part C covers V and VI module. Each part has three questions, which may have maximum four subdivisions. Among the three questions, one will be a compulsory question covering both modules and the remaining from each module, of which one to be answered. Part A & Part B questions shall carry 15 marks each and Part C questions shall carry 20 marks each with maximum 80 % for theory and 20% for logical/numerical problems, derivation and proof.