

Course code	Course Name	L-T-P - Credits	Year of Introduction
EC206	COMPUTER ORGANISATION	3-0-0-3	2016
Prerequisite: EC207 Logic Circuit Design			
Course Objectives <ul style="list-style-type: none">To impart knowledge in computer architecture.To impart knowledge in machine language programming.To develop understanding on I/O accessing techniques and memory structures.			
Syllabus 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.			
Expected outcome . The students will be able to: <ul style="list-style-type: none">i. Understand the functional units of a computerii. Identify the different types of instructionsiii. Understand the various addressing modesiv. Understand the I/O addressing systemv. Categorize the different types of memories			
Text Books: <ul style="list-style-type: none">1. David A. Patterson and John L. Hennessey, Computer Organisation and Design, Fourth Edition, Morgan Kaufmann2. David Money Harris, Sarah L Harris, Digital Design and Computer Architecture,M Kaufmann – Elsevier, 2009			
References <ul style="list-style-type: none">1. Carl Hamacher : “Computer Organization ”, Fifth Edition, Mc Graw Hill2. John P Hayes: “Computer Architecture and Organisation”, Mc Graw Hill3. William Stallings: “Computer Organisation and Architecture”, Pearson Education4. Andrew S Tanenbaum: “Structured Computer Organisation”, Pearson Education5. Craig Zacker: “PC Hardware : The Complete Reference”, TMH			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	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	
II	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	
FIRST INTERNAL EXAMINATION			
III	MIPS 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	
	Pseudo instructions, 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	
SECOND INTERNAL EXAMINATION			
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	
END SEMESTER EXAM			

Question Paper Pattern (End Sem Exam)

Maximum Marks: 100

Time : 3 hours

The question paper shall consist of three parts. Part A covers modules I and II, Part B covers modules III and IV, and Part C covers modules V and VI. Each part has three questions uniformly covering the two modules and each question can have maximum four subdivisions. In each part, any two questions are to be answered. Mark patterns are as per the syllabus with maximum 80 % for theory and 20% for logical/numerical problems, derivation and proof.