Course Code	Course Name	Teaching Scheme (Hrs.)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
ECCDLO 6012	Computer Organisation and Architecture	3	--	--	3	--	--	3

Course Code	Course Name	Examination Scheme							
		Theory Marks					Term Work	Practical and Oral	Total
		Internal assessment			End Sem. Exam	Exam. Duration (in Hrs)			
		Test 1	Test 2	Avg.					
ECCDLO 6012	Computer Organisation and Architecture	20	20	20	80	03	--	--	100

Course Pre-requisites:

ECC303-Digital System Design

ECC402-Microcontrollers

Course objectives:

1. To have a thorough understanding of the basic structure and operation of a digital computer.
2. To understand memory systems, processor organization and generation of control unit signals.
3. To demonstrate the operation of various arithmetic algorithm including integer and floating point representation.
4. To understand the working principles of multiprocessor and parallel organization's as advanced computer architectures.

Course outcomes:

After successful completion of the course student will be able to -

1. Describe Computer system along with I/O operations and performance measures.
2. Demonstrate data representation and different arithmetic algorithm for solving ALU operations.
3. Categorize memory organization and identify the function of each element of memory hierarchy.
4. Demonstrate control unit operations.
5. Articulate design issues in the development of Multiprocessor organization & architecture

Module No.	Unit No.	Topics	Hrs
1		**Computer Organization, Architecture and Performance**	8
	1.1	Organization and Architecture,	
	1.2	Structure and Function,	
	1.3	Designing for Performance,	
	1.4	Multicore, MICs, and GPGPUs	
	1.5	Two Laws that Provide Insight: Amdahl's Law and Little's Law	
	1.6	Basic Measures of Computer Performance,	
	1.7	Calculating the Mean	
	1.8	Benchmarks and SPEC	
2		**Computer System**	6
	2.1	Computer Components	
	2.2	Computer Function	
	2.3	Interconnection Structures	
	2.4	Bus Interconnection	
3		**Data Representation and Arithmetic Algorithms**	5
	3.1	Unsigned & Signed multiplication- Add & Shift Method, Booth's algorithm. Unsigned & Signed division, Restoring and non-restoring division.	
	3.2	Integer and floating point representation, IEEE 754 standard for floating point (Single & double precision) number representation.	
4		**Memory System Organization**	7
	4.1	Classification and design parameters, Memory Hierarchy ,Internal Memory: RAM, SRAM and DRAM	
	4.2	Cache Memory: Characteristics of Memory Systems, Cache Memory Principles, Elements of Cache, Cache Coherence. Design problems based on mapping techniques	
	4.3	Virtual Memory, External Memory : Magnetic Discs, Solid State Drive, Optical Memory, Flash Memories, RAID Levels	
5		**Control Unit Design**	8
	5.1	Micro- Operations: The Fetch Cycle, The Indirect Cycle, The Interrupt Cycle, The Execute cycle, The Instruction Cycle	
	5.2	Control of the Processor: Functional Requirements, Control Signals, Internal Processor Organization	
	5.3	Hardwired Control Unit	
	5.4	Microinstructions Microprogrammed Control Unit, Advantages & disadvantages	
6		**Fundamentals of Advanced Computer Architecture**	5
	6.1	Parallel Architecture: Classification of Parallel Systems,	
	6.2	Flynn's Taxonomy, Array Processors, Clusters, and NUMA Computers	
	6.3	Multiprocessor Systems : Structure & Interconnection Networks	
	6.4	Multi-Core Computers: Introduction, Organization and Performance.	
		Total	39

Text Books:

1. William Stallings "Computer Organization and Architecture Designing for Performance" Tenth Edition, Pearson Education.
2. C. Hamacher, Z. Vranesic and S. Zaky, "Computer Organization", McGrawHill,
3. Andrew S. Tanenbaum "Structured Computer Organization", Pearson, Sixth Edition

Reference books:

1. D. A. Patterson and J. L. Hennessy, "Computer Organization and Design -
2. Morris Mano. "Computer System Architecture" Pearson Publication, 3rd Edition, 2007
3. J .P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998
4. B. Govindarajulu, "Computer Architecture and Organization: Design Principles and Applications", Second Edition, Tata McGraw-Hill.

Internal Assessment:

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approximately 40% syllabus is completed and second class test when additional 40% syllabus is completed. The average marks of both the test will be considered for final Internal assessment. Duration of each test shall be of one hour.

End Semester Examination:

1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. The students need to solve total 4 questions.
3. Question No.1 will be compulsory and based on entire syllabus.
4. Remaining question (Q.2 to Q.6) will be selected from all the modules.