SUBJECT: COMPUTER SCIENCE							
DSC	**BCS-C802**	**Computer System Architecture**	**L**	**T**	**P**	**C**	**Time for ESE**
			5	**1**	**-**	**6**	**3 Hrs.**

Pre- requisite: Basic Understanding of Computer System

Course Objectives:

- To understand the basic hardware and software issues of computer organization.
- To provide an overview on the design principles of digital computing systems.
- To understand the representation of data at machine level.

Course Outcomes:

CO1	Understand the basics of digital electronics and elaborate basic computer organization, control unit and central processing unit.
CO2	To understand the fixed-point and floating-point numbers are represented in a computer.
CO3	Wide understanding of memory organization and management in a modern digital computer, including virtual and physical memory, address translation, multilevel, unified, and multi-way set-associative caches, the translation-look-aside buffer (TLB), and the page table.
CO4	To understand the working strategies of parallel processing and multi-core computers.
CO5	Discuss about pipelining in a processor functions and describe how hazards are resolved in various ways.

Course Contents

UNIT	Contents	Lectures Required
1.	**Digital Electronics**: Boolean algebra and logic Gates, Simplification of Boolean Functions, Adders, subtractors, Binary parallel adder, Decimal adder, Magnitude comparator, Decoders, Multiplexers. Flip- flops (RS, D, JK, Master-slave & T flip- flops), Flip- flop Excitation table, analysis, Design of counters, Registers, Shift register, Ripple Counter, Synchronous Counters, Timing sequences.	16
2.	**Central Processing Unit**: Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Bus Interconnection design of basic computer, register organization; Stack organization; Instruction Format and Addressing Modes. **Control Unit**: Control memory, Address Sequencing, Micro program, Design of Control Unit.	12
3.	**Arithmetic Algorithms**: Integer multiplication; Integer division, Floating point representations and Arithmetic algorithms. **I/O Organization**: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Data Transfer, Priority Interrupt, Direct Memory Access, Input Output Processor.	12
4.	**Memory Organization**: Memory Hierarchy, RAM, ROM, Associative Memory, Cache Memory Organization and Virtual Memory Organization.	10

5.	**Instruction level Parallelism:** Overviews, design issues, vector processing. **Parallel Processing:** Multiple Processor Organization, Symmetric Multiprocessors, cache coherence, multithreading, clusters, non- uniform memory access, and vector computation.	10
	Total Lectures	60

Suggested Text Book(s):

1.	M. Morris Mano, Computer System Architecture, Pearson.
2.	William Stallings, Computer Organization & Architecture - Designing for Performance Eighth Edition, Pearson.

Suggested Reference Book(s):

1.	John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach, Fourth Edition, Morgan Kaufmann Publishers.
2.	Hamacher Cart, Vranesic Zvono, Zaky Safwat, Computer Organization, McGraw Hill.

Other Useful Resource(s)

1.	https://nptel.ac.in/syllabus/106103068/
2.	https://www.geeksforgeeks.org/computer-organization-and-architecture- tutorials/

Course Outcomes Contributed to Programme Outcomes

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	AVERAGE
CO1	3	3	3	1	3	1	1	1	**2.0**
CO2	3	2	1	2	3	1	2	1	**1.9**
CO3	3	3	3	2	3	3	3	3	**2.9**
CO4	3	3	3	2	2	3	3	3	**2.8**
CO5	2	1	2	1	1	2	3	2	**1.8**
AVG.	**2.8**	**2.4**	**2.4**	**1.6**	**2.4**	**2.0**	**2.4**	**2.0**	**2.3**

Course Outcomes Contributed to Programme Specific Outcomes

PSO→ CO↓	PSO1	PSO2	PSO3	AVERAGE
CO1	3	3	1	**2.3**
CO2	3	1	2	**2.0**
CO3	3	1	3	**1.0**
CO4	2	3	3	**2.7**
CO5	2	1	3	**2.0**
AVG.	**2.6**	**1.8**	**2.4**	**1.8**