Name of the Course: Digital System and Architecture

Sr. No.	Heading	Particulars
1	**Description the course:**	**Introduction:** The Digital Systems and Architecture course serves as a foundational exploration into the fundamental principles governing digital systems and computer architecture. This course delves into the design and organization of digital circuits and systems that form the backbone of modern computing devices. **Relevance:** In the era of rapid technological advancement, understanding digital systems and architecture is paramount. From smartphones to supercomputers, digital systems are pervasive. This course is essential for anyone aspiring to comprehend the inner workings of these systems and contribute to their development. **Usefulness:** The course equips students with the knowledge and skills to design, analyze, and optimize digital systems. It serves as a gateway for students to explore various aspects of computer architecture, laying the groundwork for more advanced studies and applications in the field. **Application:** Knowledge gained in this course finds practical applications in diverse domains, including embedded systems, computer networks, signal processing, and beyond. Students will learn how to translate theoretical concepts into tangible solutions, bridging the gap between abstraction and real-world implementation. **Interest:** Digital System and Architecture is an intellectually stimulating course that captivates students with its blend of theoretical concepts and hands-on application. The allure of creating efficient and high-performing digital systems often sparks curiosity and enthusiasm among students. **Connection with Other Courses:** This course establishes crucial linkages with other courses in computer science. It provides a solid foundation for more advanced courses such as computer organization, microprocessor systems, and hardware description languages. The knowledge gained here forms a seamless continuum in the study of computer systems.

		Demand in the Industry: As the demand for faster, more efficient computing systems continues to rise, professionals well-versed in digital systems and architecture are highly sought after. Industries ranging from electronics and telecommunications to automotive and healthcare actively seek individuals with expertise in designing and optimizing digital systems. **Job Prospects:** Graduates with proficiency in digital systems and architecture find themselves well-positioned for a myriad of career opportunities. Roles may include digital design engineer, embedded systems developer, hardware architect, and systems analyst. The skills acquired in this course open doors to a wide array of industries where digital technology plays a pivotal role.
2	**Vertical:**	Major
3	**Type:**	Theory
4	**Credits:**	2 credits
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** **CO 1.** To understand fundamentals of Logic gates, Number system and Flip Flops. **CO 2.** To have an understanding of Digital System and Operation of a Digital Computer. **CO 3.** To Learn Different Architecture & Organization of memory system, processor organization and control unit. **CO 4.** Basic understanding of 8085 microprocessor and its applications.	
8	**Course Outcomes (OC):** After successful completion of this course, students would be able to - **OC 1.** Learn how number system and codes are useful in computer system design. **OC 2.** Learn how Flip Flops are useful in memory design and data communication through CPU and Memory and I/O devices. **OC 3.** Learn about basics of instruction sets and its types. **OC 4.** Learn about Processor Internal Architecture and Design.	
9	**Modules:-** **Module 1 (15 hours):**	
	Fundamentals of Digital Logic: Boolean algebra, Logic Gates, Simplification of Logic Circuits: Algebraic Simplification, Karnaugh Maps. **Combinational Circuits:** Adders, Subtractors, Multiplexer, De-Multiplexer. **Sequential Circuits:** Flip- Flops (SR, JK & D), Counters: synchronous and asynchronous Counter.	

	Computer System: Comparison of Computer Organization & Architecture, Computer Components and Functions, Interconnection Structures. Bus Interconnections, Input / Output: I/O Module Programmed I/O, Interrupt Driven I/O, Direct Memory Access.	
	Module 2 (15 hours):	
	Memory System Organization: Classification and design parameters, Memory Hierarchy, Internal Memory: RAM, SRAM and DRAM, Interleaved and Associative Memory. Cache Memory: Design Principles, Memory mappings, Replacement Algorithms, Cache performance, Cache Coherence. Virtual Memory, External Memory: Magnetic Discs, Optical Memory, Flash Memories, RAID Levels **Instructions:** Instruction Formats, Instruction Sets, Addressing Modes, Addressing Modes Examples with Assembly Language [8085/8086 CPU]. **Processor Organization:** Structure and Function. Register Organization [8085/8086 CPU]. Basic Microprocessor operations: Data Transfer (Register / Memory) Operations, Arithmetic & Logical Operations. Instruction Cycle, Instruction Pipelining. Introduction to RISC and CISC Architecture, Instruction Level Parallelism and Superscalar Processors, Design Issues.	
10	**Text Books** 1. M. Mano, Computer System Architecture 3rd edition, Pearson 2. Carl Hamacher et al., Computer Organization and Embedded Systems, 6 ed., McGraw-Hill 2012 3. R P Jain, Modern Digital Electronics, Tata McGraw Hill Education Pvt. Ltd. , 4th Edition, 2010	
11	**Reference Books** 1. William Stallings (2010), Computer Organization and Architecture-designing for performance, 8th edition, Prentice Hall, New Jersy. 2. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, PearsonEducation Inc, 3. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill 4. Ramesh Gaonkar (2013), Microprocessor Architecture, Programming and Application with 8085, 6th edition, Penram.	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%**
13	**Continuous Evaluation through:** Class Test on Module 1: 10 marks Class Test on Module 2: 10 marks **Average of 2 Class Tests: 10 marks** Assignment on Module 1: 5 marks Assignment on Module 2: 5 marks **Total of 2 Assignments: 10 marks** **Total: 20 marks**	**Evaluation through:** A **Semester End Theory Examination** of **1 hour duration** for **30 marks** as per the paper pattern given below. **Total: 30 marks**

14	**Format of Question Paper:** **Total Marks: 30** **Duration: 1 Hour**

Question	**Based On**	**Options**	Marks
Q. 1	Module 1	*Any 2 out of 4*	10
Q. 2	Module 2	*Any 2 out of 4*	10
Q. 3	Module 1 & 2	*Any 2 out of 4*	10