Hindustan College of Science and Technology

Department of
Electronics & Communication Engineering

M. TECH. (VLSI DESIGN)

COURSE OUTCOMES
(SESSION 2021-22)

Study and Evaluation Scheme M. Tech. in VLSI DESIGN

(Session:2021-22)

First Year, Semester-I

Sr. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme					Subject Total
							Theory			Practical		
			L	T	P		CT	TA	ESE	TA	ESE	
1.	MTVL101	Low Power VLSI Design	3	0	0	3	20	10	70	-	-	100
2.	MTVL102	FPGA Architecture & Applications	3	0	0	3	20	10	70	-	-	100
3.	MTVL01?	Departmental Elective I	3	0	0	3	20	10	70	-	-	100
4.	MTVL02?	Departmental Elective II	3	0	0	3	20	10	70	-	-	100
5.		Research Process & Methodology	3	0	0	3	20	10	70	-	-	100
6.	MTVL151	VLSI Circuit Design Lab	0	0	3	2	-	-	-	20	30	50
7.	MTVL152	FPGA Design Lab	0	0	3	1	-	-	-	20	30	50
		Total	15	0	6	18						600

First Year, Semester-II

Sr. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme					Subject Total
							Theory			Practical		
			L	T	P		CT	TA	ESE	TA	ESE	
1.	MTVL201	Hardware Description Languages	3	0	0	3	20	10	70	-	-	100
2.	MTVL202	VLSI DSP Architectures	3	0	0	3	20	10	70	-	-	100
3.	MTVL03?	Departmental Elective III	3	0	0	3	20	10	70	-	-	100
4.	MTVL04?	Departmental Elective IV	3	0	0	3	20	10	70	-	-	100
5.	MTVL05?	Departmental Elective V	3	0	0	3	20	10	70	-	-	100
6.	MTVL251	Advanced VLSI Design Lab	0	0	3	2	-	-	-	20	30	50
7.	MTVL252	Seminar I	0	0	3	1	-	-	-	50		50
		Total	15		6	18						600

Second Year, Semester-III

Sr. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme					Subject Total
							Theory			Practical		
			L	T	P		CT	TA	ESE	TA	ESE	
1.	MTVL351	Seminar II	0	0	6	3	-	-	-	100	-	100
2.	MTVL352	Dissertation	0	0	30	15	-	-	-	200	300	500
		Total			36	18						600

Second Year, Semester-IV

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme					Subject Total
							Theory			Practical		
			L	T	P		CT	TA	ESE	TA	ESE	
1.	MTVL451	Dissertation	0	0	36	18	-	-	-	200	400	600
		Total			36	18						600

Departmental Elective I

MTVL 011: SOC Design
MTVL 012: Designing with ASICS
MTVL 013: Analog VLSI Design

Departmental Elective II

MTVL 021: Advanced Embedded SystemsMTVL 022: Testing of VLSI Circuits MTVL 023: Digital IC Design

Departmental Elective III

MTVL 031: Advanced Microcontroller & Systems MTVL 032: VLSI based SignalProcessing ArchitecturesMTVL 033: Analog IC Design

Departmental Elective IV

MTVL 041: Real Time Operating SystemsMTVL 042: VLSI Testing &Testability MTVL 043: Memory Technologies

Departmental Elective V

MTVL 051: Algorithms for VLSI Design AutomationMTVL 052: MEMS & Micro Sensor Design
MTVL 053: Embedded System for Wireless Communication

Department: Electronics & Communication Engineering

Course Outcomes (COs):M.Tech. 1st 2nd 3rd and 4th semester

Session:2021-22

M.Tech:1st Semester		
Code	**Course Name**	**Course Outcomes**
MTVL101	**Low Power VLSI Design**	CO1:Capability to recognize advanced issues in VLSI systems, specific to the deep-submicron silicon technologies.
		CO2:Students able to understand deep submicron CMOS technology and digital CMOS design styles.
		CO3:To design chips used for battery-powered systems and highperformance circuits
MTVL102	**FPGA Architecture & Applications**	CO1: Design digital circuits using PROMs and SPLDs (Programmable Logic Array (PLA), Programmable Array Logic (PAL)
		CO2: Describe the architecture and features of CPLDs
		CO3: Explain architecture and features of SRAM, Flash and antifuse based FPGA
		CO4:Develop Verilog based programs and simulate digital circuits
		CO5:Implement digital circuits in Xilinx FPGA processor using Hardware description Language experimentally
MTVL 011	**SOC Design**	CO1: Upon successful completion of this course student should be able to: understand about SoC DesignMethodology
		CO2: Ability to understandthe design of different embedded memories.
		CO3. Validation and Testing Concepts can beunderstood.
		CO4. Investigate new techniques for future systems.
MTVL 021	**Advanced Embedded Systems**	CO1: Define embedded systems and identify applications to real word systems
		CO2: Utilize hardware, software, and peripherals involved in an embedded system
		CO3:Understand basic microprocessor and microcontroller functionality
		CO4: Explain primary microcontroller capabilities and their applications for embedded system development

	Research Process & Methodology	CO1: Demonstrate the ability to choose methods appropriate to research aims and objectives.
		CO2: Understand the limitations of particular research methods.
		CO3: Develop skills in qualitative and quantitative data analysis and presentation.
		CO4: Develop advanced critical thinking skills.
MTVL151	**VLSI Circuit Design Lab**	CO1:To learn Hardware Descriptive Language (Verilog/VHDL).
		CO2: To learn the fundamental principles of VLSI circuit design in digital and analog domain
		CO3: To familiarise fusing of logical modules on FPGAs.
		CO4: To provide hands on design experience with professional design (EDA) platforms.
MTVL152	**FPGA Design Lab**	CO1: To learn programming of FPGA with practical circuits.
		CO2: To learn and use design flow for using FPGA
		CO3: Design functional units including adders, multipliers, ROMs, SRAMs, and PLAs
		CO4: Compare the tradeoffs of sequencing elements including FFs, transparent latches, and pulsed latches
		CO5: Compare the tradeoffs of sequencing elements including FFs, transparent latches, and pulsed latches
M.Tech:2nd Semester		
MTVL201	**Hardware Description Languages**	CO1: Demonstrate the ability to discuss the Hardware Description Language.
		CO2: Appreciate the basic principles of the State Machine.
		CO3: Understand and describe the different Levels in Verilog HDL.
		CO4: Delineate and discuss how the different Levels in Verilog HDL work with state machine 5. Appreciate the principles behind Combinational and Sequential Logic circuit design
		CO5: Design Combinational and Sequential Logic circuit with HDL programming.
MTVL202	**VLSI DSP Architectures**	CO1: comprehensive understanding of different ISAs such as CISC, RISC, and DSP processors, including their essential features and implications for VLSI chip implementation
		CO2: Students will learn microprogramming approaches for the implementation of the control unit of processors.
		CO3: Students will be equipped with the knowledge to evaluate CPU performance, considering factors such as clock speed, instruction execution time, and pipeline efficiency.
		CO4Students will develop the skills needed to design data paths for processors.
		CO5: Students will explore the concept of pipelining and its role in enhancing CPU performance.

MTVL031	**Advanced Microcontroller & Systems**	CO1: Students will gain a deep understanding of the CPU architectures, instruction sets, interrupt mechanisms, clock systems, and memory subsystems of both the MSP430 (16-bit) and ARM Cortex-M3 (32-bit) microcontroller families.
		CO2: Students will learn assembly language and 'C' programming for both MSP430 and ARM Cortex-M3 microcontrollers.
		CO3Students will gain hands-on experience with on-chip peripherals such as the Watchdog Timer (WDT), Comparator, OpAmp , Timers, Real-Time Clock (RTC), Analog-to-Digital Converter (ADC), Digital-to-Analog Converter (DAC), and Digital I/O.
		CO4: Students will learn how to leverage the low-power features of the MSP430 microcontroller, including clock system management, low-power modes, clock request features, and low-power programming techniques.
		CO5: Students will apply their knowledge to real-world applications, including wireless sensor networking using MSP430 and low-power RF circuits and implementing Pulse Width Modulation (PWM) in power supplies.
MTVL042	**VLSI Testing &Testability**	CO1: Students will develop a solid understanding of the philosophy behind testing and its critical role in ensuring the reliability and functionality of Very Large Scale Integration (VLSI) circuits.
		CO2: Students will acquire in-depth knowledge of both digital and analog VLSI testing techniques, including the use of Automatic Test Equipment (ATE) and electrical parametric testing.
		CO3: Students will learn about the different types of faults in digital circuits, including permanent and temporary faults.
		CO4: Students will explore the complexities of testing sequential circuits, including iterative combinational circuit testing and test generation based on circuit structure.
		CO5: Students will delve into advanced testing methodologies, such as Built-In Self-Test (BIST) for both combinational and sequential circuits.
MTVL053	**Embedded System for Wireless & Mobile Communication**	CO1: Students will gain a comprehensive understanding of various wireless technologies, including Wireless Application Protocol (WAP), serial and parallel communication, asynchronous and synchronous communication, Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Time Frequency Multiplexing (TFM), and Spread Spectrum technology.
		CO2: Students will become proficient in Bluetooth technology, including its specifications, core protocols, and cable replacement capabilities.
		CO3: Students will acquire programming skills for developing Bluetooth applications using Java and J2ME architecture. They will learn about the javax.
		CO4: Students will explore a range of wireless networking technologies, including IrDA, HomeRF, Wireless LANs, and JINI.
		CO5: Students will delve into Bluetooth services registration and search applications.

MTVL251	**Advanced VLSI Design Lab**	CO1: Students will gain proficiency in using advanced VLSI design tools and software packages commonly employed in industry, enabling them to effectively design and analyze complex integrated circuits.
		CO2: Students will develop the ability to design complex VLSI circuits, including digital, analog, and mixed-signal designs.
		CO3: Students will have hands-on experience with fabrication processes and methodologies used in VLSI chip manufacturing.
		CO4: Students will be proficient in simulating and verifying the functionality and performance of their VLSI designs.
		CO5: Students will complete a substantial VLSI design project, applying the knowledge and skills acquired during the course. They will demonstrate the ability to plan, execute, and document their projects effectively, including presenting their work through reports and presentations.
MTVL252	**Seminar-I**	CO1: Students will develop strong presentation skills, including the ability to effectively communicate complex technical topics to a diverse audience.
		CO2: Students will become proficient in conducting comprehensive literature reviews related to their chosen research topics.
		CO3: Students will learn how to select research topics that are relevant, feasible, and align with their academic and career goals.
		CO4: Students will cultivate critical thinking skills to evaluate the validity and significance of research findings.
M.Tech:3rd Semester		
MTVL351	**Seminar II**	CO1: Demonstrate a sound technical knowledge of their selected seminar topic.
		CO2: Undertake problem identification, formulation and solution.
		CO3: Design engineering solutions to complex problems utilising a systems approach.
		CO4: Communicate with engineers and the community at large.
		CO5: Demonstrate the knowledge, skills and attitudes of a professional engineer
MTVL352	**Dissertation**	CO1:Plan, and engage in, an independent and sustained critical investigation and evaluation of a chosen research topic relevant to environment and society
		CO2. Engage in systematic discovery and critical review of appropriate and relevant information sources
		CO3. Appropriately apply qualitative and/or quantitative evaluation processes to original data
		CO4. Understand and apply ethical standards of conduct in the collection and evaluation of data and other resources
		CO5. Communicate research concepts and contexts clearly and effectively both in writing and orally

M.Tech:4th Semester		
MTVL451	**Dissertation**	CO1. Students will demonstrate the ability to formulate a clear and focused research problem, develop a research proposal that includes objectives, scope, methodology, and a literature review, and present it for approval.
		CO2. Students will engage in comprehensive research activities, including data collection, experimentation, analysis, and synthesis. They will gain expertise in their chosen field of study, apply appropriate research methods, and address research questions or hypotheses relevant to their dissertation topic.
		CO3. Students will develop strong technical writing skills, producing a well-structured, organized, and coherent dissertation document. They will also learn how to communicate their research findings effectively through written reports, presentations, and discussions.
		CO4. Students will demonstrate the ability to think critically, analyze data, and draw meaningful conclusions from their research.
		CO5. Students will understand the ethical principles and responsibilities associated with conducting research, including issues related to data integrity, human subjects, and plagiarism. They will conduct their research with integrity and adhere to ethical guidelines in all aspects of their work.