VAAGDEVICOLLEGEOF ENGINEERING
Autonomous
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DEPARTMENTOFELECTRONICS&COMMUNICATIONENGINEERING

Course Outcomes for M.Tech–VLSI SYSTEM DESIGN (R22)
for the academic year 2022-2023 onwards

Course Outcome	Year/Semester I Year/ I Sem	Subject Name (Subject Code) DIGITAL SYSTEM DESIGN WITH FPGAs (M22VL01)	No. of Hours L:3 T:0P:0	Credits:3
After the completion of this course, the students should be able to				
1	To exposes the design approaches using FPGAs.			
2	To provide in depth understanding of Fault models.			
3	To understands test pattern generation techniques for fault detection.			
4	To design fault diagnosis in sequential circuits.			
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Course Outcome	Year/Semester I Year/ I Sem	Subject Name (Subject Code) CMOS ANALOG IC DESIGN (M22VL02)	No. of Hours L:3 T:0P:0	Credits:3
After the completion of this course, the students should be able to				
1	Design basic building blocks of CMOS analog ICs.			
2	Carry out the design of single and two stage operational amplifiers and voltage references.			
3	Determine the device dimensions of each MOSFETs involved.			
4	Design various amplifiers like differential, current and operational amplifiers			
Course Outcome	Year/Semester I Year/ I Sem	Subject Name (Subject Code) (Professional Elective I) PATTERN RECOGNITION AND MACHINE LEARNING (M22VL03)	No. of Hours L:3 T:0P:0	Credits:3
After the completion of this course, the students should be able to				
1	Familiar the basics of pattern classes and functionality.			
2	Construct the various linear models.			
3	Use the different kernel methods.			
4	Design the Markov and Mixed models			
Course Outcome	Year/Semester I Year/ I Sem	Subject Name (Subject Code) (Professional Elective I) CMOS MIXED SIGNAL DESIGN (M22VL04)	No. of Hours L:3 T:0P:0	Credits:3
After the completion of this course, the students should be able to				
1	Designing CMOS analog circuits to achieve performance specifications.			
2	Analyzing CMOS based switched capacitor circuits.			
3	Designing data converters and know how to use these in specific applications			
4	Design a mixed-signal circuits with understanding design flow			
Course Outcome	Year/Semester I Year/ I Sem	Subject Name (Subject Code) (Professional Elective I) MEMORY TECHNOLOGIES (M22VL05)	No. of Hours L:3 T:0P:0	Credits:3
After the completion of this course, the students should be able to				
1	Select architecture and design semiconductor memory circuits and subsystems.			
2	Identify various fault models, modes and mechanisms in semiconductor memories			

	and theirtesting procedures.			
3	Know, how of the state-of-the-art memory chip design			
Course Outcome	**Year/Semester** **I Year/ I Sem**	**Subject Name (Subject Code)** Professional Elective II) COMMUNICATION BUSES AND INTERFACES (M22VL06)	**No. of Hours** **L:3** **T:0P:0**	**Credits:3**

After the completion of this course, the students should be able to

1	Select a particular serial bus suitable for a particular application.
2	Develop APIs for configuration, reading and writing data onto serial bus.
3	Design and develop peripherals that can be interfaced to desired serial bus

Course Outcome	**Year/Semester** **I Year/ I Sem**	**Subject Name (Subject Code)** Professional Elective II) ARM MICRO CONTROLLERS (M22VL07)	**No. of Hours** **L:3** **T:0P:0**	**Credits:3**

After the completion of this course, the students should be able to

1	Explore the selection criteria of ARM processors by understanding the functional level trade offissues.
2	Explore the ARM development towards the functional capabilities.
3	Work with ASM level program using the instruction set.
4	Programming the ARM Cortex M.

Course Outcome	**Year/Semester** **I Year/ I Sem**	**Subject Name (Subject Code)** Professional Elective II) EMBEDDED REAL TIME OPERATING SYSTEMS (M22VL08)	**No. of Hours** **L:3** **T:0P:0**	**Credits:3**

After the completion of this course, the students should be able to

1	Be able to explain real
2	Able describe how a real
3	Explain how the real
4	Be able to work with real time operating systems like RT Linux, Vx Works, MicroC /OS

Course Outcome	**Year/Semester** **I Year/ I Sem**	**Subject Name (Subject Code)** DIGITAL SYSTEM DESIGN WITH FPGAs LAB (M22VL09)	**No. of Hours** **L:0** **T:0P:4**	**Credits:2**
1	Given a set of specifications for a digital system, will be able to design the system meeting the specifications.			
2	Write a Verilog HDL code to implement a particular design/block.			
3	Use FPGAs in your design, meeting the area and delay constraints and estimate the power consumption.			
Course Outcome	**Year/Semester** **I Year/ I Sem**	**Subject Name (Subject Code)** CMOS ANALOG IC DESIGN LAB (M22VL10)	**No. of Hours** **L:0** **T:0P:4**	**Credits:2**

After the completion of this course, the students should be able to

1	Design analog Circuit using CMOS
2	Use EDA tools like Cadence, Mentor Graphics and other open source software tools likeNg spice

Course	**Year/Semester**	**Subject Name (Subject Code)** RESEARCH	**No. of Hours**	**Credits:2**

Outcome	I Year/ I Sem	METHODOLOGY AND IPR (M22VL11)	L:2 T:0P:0	

After the completion of this course, the students should be able to

1	Understand research problem formulation.
2	Analyze research related information
3	Follow research ethics
4	Understand that today's world is controlled by Computer, Information Technology, but tomorrowworld will be ruled by ideas, concept, and creativity.
5	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Course Outcome	Year/Semester I Year/ II Sem	Subject Name (Subject Code) VLSI ADVANCED PHYSICAL DESIGN (M22VL12)	No. of Hours L:3 T:0P:0	Credits:3

After the completion of this course, the students should be able to

1	Design power mesh for given specifications, analyze IR drop and EM issues and fix them.
2	Implement the low power intent of the design using current industry standard UPF.
3	Verify whether the design meets the power intent in UPF
4	Perform physical verification both at LVS & DRC level and fix all issues

Course Outcome	Year/Semester I Year/ II Sem	Subject Name (Subject Code) SYSTEM VERILOG TEST BENCHES USING UVM (M22VL13)	No. of Hours L:3 T:0P:0	Credits:3

After the completion of this course, the students should be able to

1	Implement test bench programs using system Verilog.
2	Develop random stimulus and SVAs using system Verilog.
3	Develop a UVM test bench with all its features

Course Outcome	Year/Semester I Year/ II Sem	Subject Name (Subject Code) Professional Elective III) IOT ARCHITECTURES AND SYSTEM DESIGN (M22VL14)	No. of Hours L:3 T:0P:0	Credits:3

After the completion of this course, the students should be able to

1	Integrate the sensors and actuator depending on the applications
2	Interface the IoT and M2M with value chains
3	Write Python programming for Arduino, Raspberry Pi devices
4	Design IoT based systems such as Agricultural IoT, Vehicular IoT etc.,

Course Outcome	Year/Semester I Year/ II Sem	Subject Name (Subject Code) Professional Elective III) SOC DESIGN (M22VL15)	No. of Hours L:3 T:0P:0	Credits:3

After the completion of this course, the students should be able to

1	Identify and formulate a given problem in the framework of SoC based design approaches

2	Design SoC based system for engineering applications
3	Realize impact of SoC on electronic design philosophy and Macro-electronics thereby inclinetowards entrepreneurship & skill development

Course Outcome	Year/Semester I Year/ II Sem	Subject Name (Subject Code) Professional Elective III) DESIGN FOR TESTABILITY (M22VL16)	No. of Hours L:3 T:0P:0	Credits:3
After the completion of this course, the students should be able to				
1	Acquire verification knowledge and test evaluation			
2	Design for testability rules and techniques.			
3	Utilize the scan architectures for different digital circuits.			
4	Acquire the knowledge of design of built-in-self test			

Course Outcome	Year/Semester I Year/ II Sem	Subject Name (Subject Code) Professional Elective IV) DEVICE MODELLING (M22VL17)	No. of Hours L:3 T:0P:0	Credits:3
After the completion of this course, the students should be able to				
1	Develop a functional relationship among the terminal electrical variables of the device that is tobe modeled.			
2	Describe the behavior of all components successfully			
3	Perform the simulation and analyze the VLSI circuits			
4	Use the FinFET for various applications			

Course Outcome	Year/Semester I Year/ II Sem	Subject Name (Subject Code) Professional Elective IV) RF IC DESIGN (M22VL18)	No. of Hours L:3 T:0P:0	Credits:3
After the completion of this course, the students should be able to				
1	Analyze the behavior of high frequency components.			
2	Calculate the scattering parameters of various RF components and analyze the various filterparameters.			
3	Implement component modelling and biasing networks.			
4	Design the various RF filters, amplifiers, oscillators and mixers			

Course Outcome	Year/Semester I Year/ II Sem	Subject Name (Subject Code)) (Professional Elective IV) HARDWARE AND SOFTWARE CO-DESIGN (M22VL19)	No. of Hours L:3 T:0P:0	Credits:3
After the completion of this course, the students should be able to				
1	Acquire the knowledge on various models of Co-design.			
2	Explore the interrelationship between Hardware and software in a embedded system			
3	Acquire the knowledge of firmware development process and tools during Co-design.			
4	Implement validation methods and adaptability			

Course Outcome	Year/Semester I Year/ II Sem	Subject Name (Subject Code) VLSI ADVANCED PHYSICAL DESIGN LAB (M22VL20)	No. of Hours L:0 T:0P:4	Credits:2
After the completion of this course, the students should be able to				
1	Perform pre-layout and post-layout analysis of various digital and analog CMOS circuits.			
2	Gain hands on Various EDA tools like Cadence / Mentor Graphics / Synopsys or			

	any other equivalent.
3	Understand the importance of Layout design rules and their impact in achieving the desired specifications.
4	Understand the importance of various analyses required in integrated circuit design process

Course Outcome	Year/Semester I Year/ II Sem	Subject Name (Subject Code) SYSTEM VERILOG TEST BENCHES USING UVM LAB (M22VL21)	No. of Hours L:0 T:0P:4	Credits:2

After the completion of this course, the students should be able to

1	Perform testing and verification using System Verilog.
2	Use UVM methodologies for performing digital circuit logic verification.
3	Gain hands on EDA playground Simulator

Course Outcome	Year/Semester II Year/ I Sem	Subject Name (Subject Code)) (Professional Elective V) ADVANCED COMPUTER ARCHITECTURE (M22VL23)	No. of Hours L:3 T:0P:0	Credits:3

After the completion of this course, the students should be able to

1	Familiarize the instruction set, memory addressing of Computer
2	Handle the issues in pipelining and parallelism
3	Familiarize the practical issues in inter network

Course Outcome	Year/Semester II Year/ I Sem	Subject Name (Subject Code)) (Professional Elective V) NANO MATERIALS AND NANOTECHNOLOGY (M22VL24)	No. of Hours L:3 T:0P:0	Credits:3

After the completion of this course, the students should be able to

1	Formulate new engineering solutions for current problems and competing technologies forfuture applications.
2	Made inter disciplinary projects applicable to wide areas by clearing and fixing the boundariesin system development.
3	Gather detailed knowledge of the operation of fabrication and characterization devices toachieve precisely designed systems

Course Outcome	Year/Semester II Year/ I Sem	Subject Name (Subject Code) (Professional Elective V) HARDWARE SECURITY (M22VL25)	No. of Hours L:3 T:0P:0	Credits:3

After the completion of this course, the students should be able to

1	Design a more secure systems by knowing countermeasures of various hardware attacks
2	Experiment the impressive efficiency of hardware attacks
3	Monitor computation time or power consumption to reveal secrets
4	Design a secure systems which lead to privilege escalation and compromise

Course Outcome	Year/Semester II Year/ I Sem	Subject Name (Subject Code) (Open Elective) BUSINESS ANALYTICS (M22C01)	No. of Hours L:3 T:0P:0	Credits:3

After the completion of this course, the students should be able to

1	Demonstrate knowledge of data analytics.
2	Demonstrate the ability of think critically in making decisions based on data and

	deep analytics.			
3	Demonstrate the ability to use technical skills in predicative and prescriptive modeling to supportbusiness decision-making.			
4	Demonstrate the ability to translate data into clear, actionable insights			
Course Outcome	**Year/Semester** **II Year/ I Sem**	**Subject Name (Subject Code)** (Open Elective) OPERATIONS RESEARCH (M22ME03)	**No. of Hours** **L:3** **T:0P:0**	**Credits:3**

After the completion of this course, the students should be able to

1	Apply the dynamic programming to solve problems of discreet and continuous variables.
2	Apply the concept of non-linear programming
3	Carry out sensitivity analysis
4	Model the real-world problem and simulate it

Course Outcome	**Year/Semester**	**Subject Name (Subject Code)** (Audit Course) SANSKRIT FOR TECHNICAL KNOWLEDGE (M22AC03)	**No. of Hours** **L:2** **T:0P:0**	**Credits:0**

After the completion of this course, the students should be able to

1	Understanding basic Sanskrit language
2	Ancient Sanskrit literature about science & technology can be understood
3	Being a logical language will help to develop logic in students

Course Outcome	**Year/Semester**	**Subject Name (Subject Code)** (Audit Course) VALUE EDUCATION (M22AC04)	**No. of Hours** **L:2** **T:0P:0**	**Credits:0**

After the completion of this course, the students should be able to

1	Knowledge of self-development
2	Learn the importance of Human values
3	Developing the overall personality

Course Outcome	**Year/Semester**	**Subject Name (Subject Code)** (Audit Course) CONSTITUTION OF INDIA (M22AC05)	**No. of Hours** **L:2** **T:0P:0**	**Credits:0**

After the completion of this course, the students should be able to

1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrivalof Gandhi in Indian politics.
2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4	Discuss the passage of the Hindu Code Bill of 1956.

Course Outcome	**Year/Semester**	**Subject Name (Subject Code)** (Audit Course) PEDAGOGY STUDIES (M22AC06)	**No. of Hours** **L:2**	**Credits:0**

			T:0P:0	
After the completion of this course, the students should be able to				
1	What pedagogical practices are being used by teachers in formal and informal classrooms indeveloping countries?			
2	What is the evidence on the effectiveness of these pedagogical practices, in what conditions,and with what population of learners?			
3	How can teacher education (curriculum and practicum) and the school curriculum and guidancematerials best support effective pedagogy?			
4	What pedagogical practices are being used by teachers in formal and informal classrooms indeveloping countries?			
Course Outcome	**Year/Semester**	**Subject Name (Subject Code)** (Audit Course) STRESS MANAGEMENT BY YOGA (M22AC07)	**No. of Hours** **L:2** **T:0P:0**	**Credits:0**
After the completion of this course, the students should be able to				
1	Demonstrate knowledge of data analytics.			
2	Demonstrate the ability of think critically in making decisions based on data and deep analytics.			
3	Demonstrate the ability to use technical skills in predicative and prescriptive modeling to supportbusiness decision-making.			
4	Demonstrate the ability to translate data into clear, actionable insights			
Course Outcome	**Year/Semester**	**Subject Name (Subject Code)** (Audit Course) PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS (M22AC08)	**No. of Hours** **L:2** **T:0P:0**	**Credits:0**
After the completion of this course, the students should be able to				
1	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality andachieve the highest goal in life			
2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity			
3	Study of Neetishatakam will help in developing versatile personality of students			
4	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality andachieve the highest goal in life			