

# SHRI VENKATESHWARA UNIVERSITY



## Syllabus

**M.TECH (VLSI) PART TIME**

**(Two Years Post Graduation Programme)**

**IV SEMESTER**

**(w.e.f. 2019-20)**

**SCHOOL OF ENGINEERING &  
TECHNOLOGY**

SEMESTER-IV													
Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	WVI-401	VLSI Design Verification and Testing	3	0	0	20	10	30		70		100	3
2	WVI-042	Network Security and Cryptography	3	0	0	20	10	30		70		100	3
3	WVI-411	VLSI Design Verification and Testing Lab	0	0	4				25		25	50	2
4	WVI-421	Mini Project	0	0	4				50		50	100	2
		Total										350	10

## Syllabus Contents:

**Unit 1:** Verification guidelines: Verification Process, Basic Testbench functionality, directed testing, Methodology basics, Constrained-Random stimulus, Functional coverage, Testbench components, Layered testbench, Building layered testbench, Simulation environment phases, Maximum code reuse, Testbench performance.

**Unit 2:**Data types: Built-in data types, Fixed-size arrays, Dynamic arrays, Queues, Associative arrays, Linked lists, Array methods, Choosing a storage type, Creating new types with typedef , Creating user-defined structures, Type conversion, Enumerated types, Constants strings, Expression width.

**Unit 3:**Procedural statements and routines: Procedural statements, tasks, functions and void functions, Routine arguments, Returning from a routine, Local data storage, Time values  
Connecting the testbench and design: Separating the testbench and design, Interface constructs, Stimulus timing, Interface driving and sampling, Connecting it all together, Top-level scope  
Program – Module interactions.

**Unit 4:** SystemVerilog Assertions: Basic OOP: Introduction, think of nouns, Not verbs, your first class, where to define a class, OOP terminology, Creating new objects, Object deallocation, Using objects, Static variables vs. Global variables, Class methods, Defining methods outside of the class, Scoping rules, Using one class inside another, Understanding dynamic objects, Copying objects, Public vs. Local, Straying off course building a testbench.

**Unit 5:**Randomization: Introduction, What to randomize, Randomization in SystemVerilog, Constraint details solution probabilities, Controlling multiple constraint blocks, Valid constraints, In-line constraints, The pre\_randomize and post\_randomize functions,

**Unit 6:**Random number functions, Constraints tips and techniques, Common randomization problems, Iterative and array constraints, Atomic stimulus generation vs. Scenario generation, Random control, Random number generators, Random device configuration.

# References:

- Chris Spears, “ System Verilog for Verification”, Springer, 2nd Edition
- M. Bushnell and V. D. Agrawal, "Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits", Kluwer Academic Publishers
- IEEE 1800-2009 standard (IEEE Standard for System Verilog— UnifiedHardware Design, Specification, and Verification Language).
- System Verilog website – [www.systemverilog.org](http://www.systemverilog.org)
- [http://www.sunburstdesign.com/papers/CummingsSNUG2006Boston\\_SystemVerilogEvents.pdf](http://www.sunburstdesign.com/papers/CummingsSNUG2006Boston_SystemVerilogEvents.pdf)
- General reuse information and resources [www.design-reuse.com](http://www.design-reuse.com)
- OVM, UVM(on top of SV) [www.verifacationacademy.com](http://www.verifacationacademy.com)
- Verification IP resources [http://www.cadence.com/products/fv/verification\\_ip/pages/default.aspx](http://www.cadence.com/products/fv/verification_ip/pages/default.aspx)
- <http://www.synopsys.com/Tools/Verification/FunctionalVerification/VerificationIP/Pages/default.aspx>

Code	Course Name	L-T-P	Cr.
WVI-411	VLSI Design Verification and Testing Lab	0-0-4	2

**Course Outcomes:** At the end of the laboratory work, students will be able to:

- Verify increasingly complex designs more efficiently and effectively.
- Use EDA tools like Cadence, Mentor Graphics.

## List of Assignments:

1. Sparse memory
2. Semaphore
3. Mail box
4. Classes
5. Polymorphism
6. Coverage

Assertions

Code	Course Name	L-T-P	Cr.
WVI-042	Network Security and Cryptography	3-0-0	3

**Course Outcomes:** At the end of the course, students will be able to:

- Identify and utilize different forms of cryptography techniques.
- Incorporate authentication and security in the network applications.
- Distinguish among different types of threats to the system and handle the same.

## **Syllabus Contents:**

### **Unit 1: Security**

- Need, security services, Attacks, OSI Security Architecture, one time passwords, Model for Network security, Classical Encryption Techniques like substitution ciphers, Transposition ciphers, Cryptanalysis of Classical Encryption Techniques.

### **Unit 2: Number Theory**

- Introduction, Fermat's and Euler's Theorem, The Chinese Remainder Theorem, Euclidean Algorithm, Extended Euclidean Algorithm, and Modular Arithmetic.

### **Unit 3: Private-Key (Symmetric) Cryptography**

- Block Ciphers, Stream Ciphers, RC4 Stream cipher, Data Encryption Standard (DES), Advanced Encryption Standard (AES), Triple DES, RC5, IDEA, Linear and Differential Cryptanalysis.

**Unit 4: Public-Key (Asymmetric) Cryptography**

- RSA, Key Distribution and Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography, Message Authentication Code, hash functions, message digest algorithms: MD4 MD5, Secure Hash algorithm, RIPEMD-160, HMAC.

**Unit 5: Authentication**

- IP and Web Security Digital Signatures, Digital Signature Standards, Authentication Protocols, Kerberos, IP security Architecture, Encapsulating Security Payload, Key Management, Web Security Considerations, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction.

**Unit 6: System Security**

Intruders, Intrusion Detection, Password Management, Worms, viruses, Trojans, Virus Countermeasures, Firewalls, Firewall Design Principles, Trusted Systems.

**References:**

- William Stallings, “Cryptography and Network Security, Principles and Practices”, Pearson Education, 3rd Edition.
- Charlie Kaufman, Radia Perlman and Mike Speciner, “Network Security, Private Communication in a Public World”, Prentice Hall, 2nd Edition
- Christopher M. King, ErtemOsmanoglu, Curtis Dalton, “Security Architecture, Design Deployment and Operations”, RSA Pres,
- Stephen Northcutt, LenyZeltser, Scott Winters, Karen Kent, and Ronald W. Ritchey, “Inside Network Perimeter Security”, Pearson Education, 2nd Edition
- Richard Bejtlich, “The Practice of Network Security Monitoring: Understanding Incident