

NIRMA UNIVERSITY
SCHOOL OF TECHNOLOGY, INSTITUTE OF TECHNOLOGY
M. Tech. in Electronics and Communication Engineering (Embedded System)
M.Tech. Semester - II
Department Elective III

L	T	P	C
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Course Code	3EC32D304
Course Title	Testing and Verification of Embedded Systems

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Propose the verification architecture of given Embedded Systems.
2. Apply the concepts of hardware – software co design from testing and verification point of view.
3. Design SoC test wrapper for embedded systems.
4. Perform testing on given embedded software components.

Syllabus:

Teaching Hours:

UNIT I: Introduction

02

Need of Testing, Different Roles of Testing, Cost and product considerations with reference to Testing

UNIT II: Functional Verification Methods and Tools

10

Concept, Test Bench Architecture, Test Bench Generation, Monitors, Checkers, Scoreboard, Verification Language, Simulation tools, Emulation, Functional and Code Coverage, Assertion based Verification

UNIT III: Formal Verification Methods

04

Binary Decision Diagram, Equivalence Checking, Model Checking

UNIT IV: Challenges in Testing and Verification of Embedded Systems

05

Design-for-Test, Built in Self-Test, Design-for-Manufacturing, Design-for-Upgrades, Over the Air Interface, Embedded System Test Jig Design, Testing of Asynchronous Systems

UNIT V: SoC Testing

05

Introduction to IP Testing-Memory Testing and FPGA Testing, Core Based Testing and Test Wrapper, SoC and Embedded System Testing

UNIT VI: Embedded Software Testing

04

Criteria for Embedded Software Testing, Methods and Tools of Software Testing, Validation, Unit Level Testing, Component Testing, Integrated Testing, System Level Testing

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

Suggested Readings:

1. Malvin A Breuer, Diagnosis and Reliable Design of Digital System, Computer Science Press
2. Laung-Terng Wang, VLSI Test Principals and Architecture:, Morgan Kaufman
3. Bart Broekman, Edwi Notenboom, Testing Embedded Software, Pearson Education
4. Daniel W Lewis, Fundamentals of Embedded Software: where C and Assembly meet, Prentice Hall
5. Michael L. Bushnell and Vishwani D. Agrawal Essential of Electronic Testing for Digital, Memory and Mixed Signal VLSI Circuits, Kluwer Academic Publishers

L = Lecture, T = Tutorial, P = Practical, C = Credit