

AP5291 HARDWARE - SOFTWARE CO-DESIGN

DETAILED SYLLABUS

OBJECTIVES:

- To acquire the knowledge about system specification and modelling.
- To learn the formulation of partitioning
- To study the different technical aspects about prototyping and emulation.

UNIT I SYSTEM SPECIFICATION AND MODELLING

Embedded Systems, Hardware/Software Co-Design, Co-Design for System Specification and Modeling, Co-Design for Heterogeneous Implementation - Single-Processor Architectures with one ASIC and many ASICs, Multi-Processor Architectures, Comparison of Co- Design Approaches, Models of Computation, Requirements for Embedded System Specification.

UNIT II HARDWARE / SOFTWARE PARTITIONING

The Hardware/Software Partitioning Problem, Hardware-Software Cost Estimation, Generation of the Partitioning Graph, Formulation of the HW/SW Partitioning Problem, Optimization, HW/SW Partitioning based on Heuristic Scheduling, HW/SW Partitioning based on Genetic Algorithms.

UNIT III HARDWARE / SOFTWARE CO-SYNTHESIS

The Co-Synthesis Problem, State-Transition Graph, Refinement and Controller Generation, Co Synthesis Algorithm for Distributed System- Case Studies with any one application.

UNIT IV PROTOTYPING AND EMULATION

Introduction, Prototyping and Emulation Techniques, Prototyping and Emulation Environments, Future Developments in Emulation and Prototyping, Target Architecture-Architecture Specialization Techniques, System Communication Infrastructure, Target Architectures and Application System Classes, Architectures for Control-Dominated Systems, Architectures for Data-Dominated Systems Mixed Systems and Less Specialized Systems

UNIT V DESIGN SPECIFICATION AND VERIFICATION

Concurrency, Coordinating Concurrent Computations, Interfacing Components, Verification, Languages for System-Level Specification and Design System-Level Specification, Design Representation for System Level Synthesis, System Level Specification Languages, Heterogeneous Specification and Multi-Language Co- simulation.

REFERENCES:

1. Giovanni De Micheli, Rolf Ernst Morgon," Reading in Hardware/Software Co-Design "Kaufmann Publishers,2001.
2. Jorgen Staunstrup, Wayne Wolf, "Hardware/Software Co-Design: Principles and Practice", Kluwer Academic Pub,1997.
3. Ralf Niemann, "Hardware/Software Co-Design for Data Flow Dominated Embedded Systems", Kluwer Academic Pub, 1998.