

Year & Sem:	Course Code: EC3504	Course Name: An Introduction to Electronics Systems Packaging	No. of Credits: 4	L 2	T&PS 2	P 0
Unit-I: Electronic system packaging Introduction, history of semiconductors, Packaging aspects of handheld products; Case studies in applications, Wafer fabrication, inspection and testing, Wafer packaging, Packaging evolution; Chip connection choices, Wire bonding, TAB and flip chip. Unit-II: Semiconductor packages Introduction, Why packaging? Single chip packages or modules (SCM), Commonly used packages and advanced packages; Materials in packages, Advances packages (continued); Thermal mismatch in packages; Current trends in packaging, Multichip modules (MCM)-types; System in package (SIP);Packaging roadmaps; Hybrid circuits. Unit-III: Electrical Design considerations in systems packaging and CAD for printed wiring boards Electrical Issues- Resistive Parasitic, Capacitive and Inductive Parasitic, Layout guidelines and the Reflection problem, Interconnection. Introduction to DFM, DFR & DFT, Components of a CAD package and its highlights, Design Flow considerations, Beginning a circuit design with schematic work and component layout, examples of layout and routing; Technology file generation from CAD; DFM check list and design rules; Design for Reliability Unit-IV: Printed Wiring Board Technologies: Board level packaging aspects Review of CAD output files for PCB fabrication; Photo plotting and mask generation, Process flow-chart, PWB substrates, Substrates continued, Video highlights; Surface preparation, Photo resist and application methods, UV exposure and developing, printing technologies for PWBs PWB etching; Resist stripping, Screen-printing technology, Through-hole manufacture process steps; Panel and pattern plating methods, Video highlights on manufacturing, Solder mask for PWBs; Multilayer PWBs; Introduction to microvias, Microvia technology and Sequential build-up technology process flow for high-density interconnects, Conventional Vs HDI technologies; Flexible circuits; Tutorial session Unit-V: Surface Mount Technology SMD benefits, Design issues; Introduction to soldering, Reflow and Wave Soldering methods to attach SMDs, Solders; Wetting of solders; Flux and its properties, Defects in wave soldering, Vapour phase soldering, BGA soldering and Desoldering/Repair, SMT failures, SMT failure library and Tin Whisker, Tin-lead and lead-free solders, Phase diagrams; Thermal profiles for reflow soldering; Lead-free alloys, Lead-free solder considerations; Green electronics; RoHS compliance and e-waste recycling issues. Unit-VI: Thermal Design considerations in systems packaging Thermal Design considerations in systems packaging, Introduction to embedded passives; Need for embedded passives; Design Library; Embedded resistor processes, Embedded capacitors, Processes for embedding capacitors; Case study examples; Summary of materials in packaging References/Text Books: 1. Rao R. Tummala, Fundamentals of Microsystems Packaging, McGraw Hill, NY, 2001. 2. William D.Brown,Advanced Electronic Packaging, IEEE Press, 1999.						

3. "Micromechanics and MEMS: Classic and Seminal Papers to 1990. " by William Trimmer, IEEE Press, IEEE Number PC4390, ISBN 0-7803-1085-3, New York.

Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations.

Video Lectures (Web Links):

1. <http://nptel.ac.in/syllabus/108108031/>
- 2.

Study Materials (Web Links):

- 1.
- 2.

Problems & Solutions (Web Links):

- 1.
- 2.

Assignments (Web Links):

- 1.
- 2.