



Course Title: PCB Design & Production

Course Code: to be decided later

Credit Units: 2

Level: UG

L	T	P/S	SW/F W	No. of PSDA	TOTAL CREDIT UNITS
0	1	0	2	3	2

	Course Title: PCB Design & Production	Comments (if any)
1	Course Objectives: This course will teach teams of students how to design and fabricate PCB for prototyping as well as in Industrial Production environment. This will help students to innovate faster with electronics technology.	
2	Prerequisites: Basic electronics concepts	
3	Course Learning Outcomes: The students will be able to <ul style="list-style-type: none">• Understand a single layer and multilayer PCB• Create and fabricate a PCB• Evaluate and test a PCB	
4	Module I: Introduction Need for PCB, Types of PCBs : Single and Multilayer, Technology: Plated Through Hole, Surface Mount, PCB Material, Electronic Component packaging, PCB Designing, Fabrication, Production, Electronic Design Automation Tools: Proprietary tools like Eagle, Ultiboard, Orcad and Opensource tools like KiCad, Design Issues: Transmission line, Cross talk and Thermal management	30%

5	Module II: PCB Design							
	Introduction to KiCad, Schematic entry / drawing, netlisting, layering, component foot print library selection & designing, design rules, component placing: Manual & automatic, track routing: automatic & manual, rules: track length, angle, joint & size, Autorouter setup. IPC standards for schematic, designing, material and documentation	35%						
6	Module III: PCB Prototyping and Production							
	PCB Prototyping: CNC Machine, Photo-Lithography process, Screen Printing process and chemical etching. PCB Mass Manufacturing Process: Gerber Generation, CAM, panelization, cleaning, drilling, plating, screen printing, etching, automated optical inspection, tinning, solder resist, legend printing, pcb testing	35%						
7	<p>Pedagogy for Course Delivery: There will be two phases in the course:</p> <ul style="list-style-type: none"> • A tutorial portion on designing, fabrication and testing of PCB. Teams of students will design their own PCB for a simple product of their choice, build simple prototypes of their design, and document their pcb design and prototyping. To stimulate pcb design concepts guest lectures will be invited to present a range of design challenges. Challenge areas will include consumer products and the needs of the developing world, sustainability, and other users of non-profit organization services. However, it will be the students that choose the topic of the product they wish to pursue. Students will form teams around the concepts they generate. Outside experts will be invited to review the PCB design and prototyping. • A lab portion of the course will instruct students in design and prototype development of PCB in areas such as learning required software and hardware. 							
	<p>List of Professional Skill Development Activities (PSDA):</p> <ol style="list-style-type: none"> 1. Study the concept of designing single layer and multilayer PCB. 2. Develop a PCB for any application provided. 3. Study the testing procedure of PCB. <p>Assessment/ Examination Scheme:</p> <table border="1" data-bbox="226 1278 1496 1398"> <thead> <tr> <th data-bbox="226 1278 622 1358">Theory L/T (%)</th> <th data-bbox="622 1278 1128 1358">Lab/Practical/Studio/SW (%)</th> <th data-bbox="1128 1278 1496 1358">Total (%)</th> </tr> </thead> <tbody> <tr> <td data-bbox="226 1358 622 1398">0</td> <td data-bbox="622 1358 1128 1398">100</td> <td data-bbox="1128 1358 1496 1398">100</td> </tr> </tbody> </table> <p>Lab/ Practical/ Studio/SW Assessment:</p>	Theory L/T (%)	Lab/Practical/Studio/SW (%)	Total (%)	0	100	100	
Theory L/T (%)	Lab/Practical/Studio/SW (%)	Total (%)						
0	100	100						

Internal Components (Drop down)	Presentation (P)	Home Assignment (HA)	Project (P)	Poster Presentation (PP)	Viva Voce (V)	Attendance (A)
Linkage of PSDA with Internal Assessment Component, if any	PSDA 3	PSDA 1	PSDA1, PSDA2, PSDA 3	PSDA 3	PSDA 3	
Weightage (%)	10	10	40	20	15	5

Mapping Continuous Evaluation with CLOs

Course Level Outcomes	CLO1	CLO2	CLO3
Assessment type			
Assessment Component 1	✓	✓	✓
Assessment Component 2	✓		
Assessment Component 3	✓	✓	✓
Assessment Component 4		✓	✓
Assessment Component 5		✓	✓

References:

1. Jon Varteresian, Fabricating Printed Circuit Boards, Newnes, 2002
2. R. Tummala, Fundamentals of Microsystems Packaging, McGraw-Hill 2001
3. Mark Madou, Fundamentals of Microfabrication, CRC Press, ISBN: 0-8493-9451-1
4. Elaine Rhodes, Developing Printed Circuit Assemblies: From Specifications to Mass Production, 2008
5. C. Robertson. PCB Designer's Reference. Prentice Hall, 2003

6. C. Coombs, Printed Circuits Handbook, McGraw-Hill Professional, 6 edition, 2007
7. V. Shukla, Signal Integrity for PCB Designers, Reference Designer, 2009
8. D. Brooks, Signal Integrity Issues and Printed Circuit Board Design, Prentice Hall, 2003
9. B. Archambeault, J. Dreuiawniak, PCB Design for Real-World EMI Control, Springer, 2002
10. RS Khandpur, Printed Circuit Board, Tata McGraw Hill Education Pvt Ltd., New Delhi
11. S D Mehta, Electronic Product Design Volume-I, S Chand Publications
12. Open source EDA Tool KiCad Tutorial: <http://kicad-pcb.org/help/tutorials/>
13. PCB Fabrication user guide page: <http://www.wikihow.com/Create-Printed-Circuit-Boards> ,
http://www.siongboon.com/projects/2005-09-07_home_pcb_fabrication/ ,
http://reprap.org/wiki/MakePCBInstructions#Making_PCBs_yourself
14. PCB Fabrication at home(video): <https://www.youtube.com/watch?v=mv7Y0A9YeUc>,
<https://www.youtube.com/watch?v=imQTCW1yWkg>