

RGPV (Diploma Wing ) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code		CO Code	LO Code	Format No. <b>4</b>
					E	0	3	5	0		1	
<b>COURSE NAME</b>	PCB Designing & Minor Project Lab											
<b>CO Description</b>	Apply different types of EDA tools for PCB designing.											
<b>LO Description</b>	Select appropriate type of PCB and EDA tool for a particular application.											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks					
LO-01	<p><b>Printed Circuit Board (PCB)</b>- Introduction, Difference between PWB and PCB, Types of PCBs: Single Sided (Single Layer), Multi-Layer (Double Layer), List of PCB Materials with their advantages/disadvantages (Standard FR-4 Epoxy Glass, Multifunctional FR-4, Tetra Functional FR-4, NelcoN400-6, GETEK, BT Epoxy Glass, Cyanate Aster, Plyimide Glass, Teflon)</p> <p><b>Electronic design automation (EDA) tools</b> - classification and comparison. Hands on Practice on any of the EDA tools. Suggested list of EDA tools for simple comparative discussion- Proprietary - OrCAD, Proteus, Eagle, TINA-Pro, Multisim etc. Free/Open Source - KiCAD, e-Sim, LTSpice, TINA-TI, PCB wizard etc.</p>	Interactive class-room/lab lecture, assignments, lab demonstration, hands on practice on EDA tools, lab assignments.	<ul style="list-style-type: none"> <li>Teacher will explain the contents and provide handouts to students.</li> <li>Teacher with support from lab staff will demonstrate the procedure of lab experiments.</li> <li>Student will practice on EDA tools and conduct lab assignment based on experiments.</li> </ul>	--	10	Lab manual, charts, computer with relevant simulation software and high speed internet.						
SCHEME OF ASSESSMENT												
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal							

LO-01	Practical test in laboratory	<b>Student will be asked to (and/or):</b> 1. List out and identify different type of PCB. 2. Compare different type PCB materials. 3. Perform given task on EDA tool.	10	Rubrics/Rating scale	External
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**ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)**

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		<i>E</i>	<i>0</i>	<i>3</i>	<i>5</i>	<i>0</i>		<i>1</i>	<i>2</i>	

<b>COURSE NAME</b>	<b>PCB Designing &amp; Minor Project Lab</b>
<b>CO Description</b>	Apply different types of EDA tools for PCB designing.
<b>LO Description</b>	Demonstrate the process of PCB designing on any EDA tool.

#### SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-02	<p><b>Use of any EDA tool for identification and use of –</b></p> <ol style="list-style-type: none"> <li>Active Components – Diode, Transistor, MOSFET, LED, SCR, Integrated Circuits (ICs)</li> <li>Passive Components – Resistor, Capacitor, Inductor, Transformer, Speaker/Buzzer</li> <li>Component Package Types - Through Hole Packages - Axial lead, Radial Lead, Single Inline Package(SIP), Dual Inline Package(DIP) Transistor Outline(TO), Surface Mounted Device- Pin Grid Array(PGA), Metal Electrode Face(MELF), Leadless Chip Carrier(LCC), Small Outline Integrated Circuit(SOIC), Quad Flat Pack(QFP) and Thin QFP (TQFP), Ball Grid Array(BGA), Plastic Leaded Chip, Carrier(PLCC)</li> </ol> <p><b>Use of any EDA tool for schematic design –</b> Schematic Entry, Net listing, PCB Layout Designing, Prototype Designing, Design Rule Check(DRC), Design For Manufacturing(DFM),</p>	Interactive class-room/lab lecture, assignments, lab demonstration, hands on practice on EDA tools, lab assignments.	<ul style="list-style-type: none"> <li>Teacher will explain the contents and provide handouts to students.</li> <li>Teacher with support from lab staff will demonstrate the procedure of lab experiments.</li> <li>Student will practice on EDA tools and conduct lab assignment based on experiments.</li> </ul>	--	10	Lab manual, charts, computer with relevant simulation software and high speed internet.	

#### SCHEME OF ASSESSMENT

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LO-02	Practical test in laboratory	<b>Student will be asked to(and/or):</b> 1. Identify and use any given components on EDA tools. 2. Prepare a schematic for given circuit on EDA tool.	10	Rubrics/Rating scale	Internal
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<b>COURSE NAME</b>	<b>PCB Designing &amp; Minor Project Lab</b>
<b>CO Description</b>	Construct PCB for a given electronic circuit.
<b>LO Description</b>	Identify different PCB layers on any EDA tool.

#### SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
LO-03	<b>Working with PCB Layers on any EDA tool -</b> Electrical Layers- Top Layer, Mid Layer, Bottom Layer, Mechanical Layers- Board Outlines and Cutouts, Drill Details, Documentation Layers- Components Outlines, Reference Designation, Text <b>Keywords &amp; Their Description</b> Footprint, Pad stacks, Vias, Tracks, Color of Layers, PCB Track Size Calculation Formula <b>Rules for Track</b> Track Length, Track Angle, Rack Joints, Track Size, <b>Study of IPC Standards for</b> Schematic Design, PCB Designing, PCB Materials, Documentation and PCB Fabrication	Interactive class-room/lab lecture, assignments, lab demonstration, hands on practice on EDA tools, lab assignments.	<ul style="list-style-type: none"> <li>Teacher will explain the contents and provide handouts to students.</li> <li>Teacher with support from lab staff will demonstrate the procedure of lab experiments.</li> <li>Student will practice on EDA tools and conduct lab assignment based on experiments.</li> </ul>	--	10	Lab manual, charts, computer with relevant simulation software and high speed internet.	

#### SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
LO-03	Practical test in laboratory	<b>Student will be asked to</b> 1. List out the rules of PCB design on EDA tools. 2. Prepare PCB layers with mentioning of keywords and description on EDA tools.	10	Rubrics/Rating scale	Internal

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<b>COURSE NAME</b>	<b>PCB Designing &amp; Minor Project Lab</b>										
<b>CO Description</b>	Construct PCB for a given electronic circuit.										
<b>LO Description</b>	Assemble PCB for any given electronic circuit.										
<b>SCHEME OF STUDY</b>											
<b>S. No.</b>	<b>Learning Content</b>	<b>Teaching –Learning Method</b>	<b>Description of T-L Process</b>	<b>Teach Hrs.</b>	<b>Pract. /Tut Hrs.</b>	<b>LRs Required</b>			<b>Remarks</b>		
LO-04	<b>Hands-on practice of PCB Making and Minor project-</b> Hands on working of PCB fabrication (suggested list given) and understanding of some concepts like- Auto-routing, Gerber-generation, List of circuits for PCB making- Basic and Analog Electronic Circuits (rectifier, amplifier, oscillator etc.), Power Supplies, Different Sensor modules and simple Electronics Projects.	Interactive class-room/lab lecture, assignments, lab demonstration, hands on practice on PCB design and preparation, lab assignments.	<ul style="list-style-type: none"> <li>Teacher will explain the contents and provide handouts to students.</li> <li>Teacher with support from lab staff will demonstrate the procedure of lab experiments.</li> <li>Student will prepare simple electronics circuit</li> </ul>	--	15	Lab manual, charts, PCB with required material and tools and components, computer with relevant simulation software and high speed internet.					
<b>SCHEME OF ASSESSMENT</b>											
<b>S. No.</b>	<b>Method of Assessment</b>	<b>Description of Assessment</b>			<b>Maximum Marks</b>	<b>Resources Required</b>			<b>External / Internal</b>		
LO-04	Practical test in laboratory	<b>Student will be asked to(and/or):</b> 1. Design and prepare a PCB for a simple electronics circuit. 2. Prepare a hand written report on designed circuit (In practical file only as an experiment).			20	Rubrics/Rating scale			External		

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