

GUJARAT TECHNOLOGICAL UNIVERSITY



Program Name: Bachelor of Engineering

Level: UG

Branch: Electronics and Communication

Subject Code: BE05000421

Subject Name: PCB Designing and Fabrication

WEF Academic Year :	2024-25
Semester :	5
Category of the Course :	Professional Elective Course - 2

Course Outcome :

After Completion of the Course, Student will able to :

No	Course Outcomes	RBT Level*
01	Understand the fundamentals of PCB design, including board types, materials, manufacturing processes, and industry standards.	UN
02	Create schematic designs and develop PCB layouts using professional EDA tools while applying design rules and constraints.	EL
03	Generate complete fabrication and assembly outputs (Gerber files, BOM, drill files) and evaluate designs for manufacturability and testing.	CR

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Teaching and Examination Scheme

Teaching/Learning Scheme in hrs/semester					Total Credits	Assessment Pattern and Marks					Total Marks
L	T	P	PBL*	TH	TH/30	Theory		Practical			
						ESE (E)	PA (M)	PA (I)	PBL(I)	ESE (V)	
45	0	30	15	90	3	70	30	20	30	50	200

Where L = Lecture, T= Tutorial, P= Practical, TW/SL = Term-Work / Self-Learning, TH = Total Hours, ESE = End-Semester Examination, PA = Progressive Assessment

* **Problem Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.**

Course Content :

Sr. No.	Content	Total Hrs
1	Introduction to PCB designing concepts Introduction to PCB designing concepts: Introduction & Brief History, Introduction to Electronic design Automation (EDA)	3

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2	Component introduction and their categories: Types of Components, Component Package Types,	3
3	Introduction to Development Tools: • Introduction to PCB Design using OrCAD tool • Introduction to PCB Design using PROTEUS tool	3
4	Detailed description and practical of PCB designing PCB Designing Flow Chart, Description of PCB Layers, Keywords & Their Description, PCB Materials, Rules for tracks, Study of IPC Standards	3
5	Lab practice and designing concepts Starting the PCB designing, Auto routing, PCB Designing practice, Post Designing & PCB Fabrication Process, Project Work	3

This syllabus is mapped with following United Nation's Sustainable Development Goals:

SDG 4 - Quality Education.

SDG 8 - Decent Work and Economic Growth,

SDG 9 - Industry, Innovation and Infrastructure,

SDG 12 - Responsible Consumption and Production,

SDG 13 -Climate Action

Relevant BIS standards:

IS/IEC 61000 Series – Electromagnetic Compatibility (EMC)

IS 14700 Series – EMC Requirements

IS 2465 – Specification for Rigid Printed Wiring Boards

IS 10198 – Specification for Flexible Printed Circuits

Also explore other relevant Indian and international standards.

Reference Book :

1. *Printed Circuit Board Designer's Reference: Basics* — Christopher T. Robertson
2. *A Guide to Printed Circuit Board Design* — Charles Hamilton
3. *Designing Circuit Boards with EAGLE* — Matthew Scarpino

Suggested Course Practical List :

Faculty can provide any circuit and ask students to design and develop PCB throughout semester.

1. Making the schematic of Academic and Industrial projects
2. PCB Designing of these projects
3. Soldering and De-soldering of components as per Design
4. Testing and Troubleshooting Methods

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Major Equipment/software:

Soldering Setup

OrCAD or KiCAD like PCB designing tool

Laboratory/Learning Resources Required:

1. <https://nptel.ac.in/courses/108/108/108108147/>

Activities suggested under Self-learning/Team Work:

Sl. No.	Name of the activity	No. of hours	Evaluation Criteria
1.	Industry/Research laboratory visit	Visit = 5h, Report preparation = 5h Total = 10h	Based on report submitted. Report should contain observations and calculations based on industry/ lab data.
2.	Technical Video based learning related to the subject	Duration of video = 5h Report preparation = 5h Total = 10h	Report /presentation based on the video learning outcomes.
3.	Assignment writing. Numericals based assignment is preferable.	5 assignments of 2h each. Total = 10h	Based on the assignment submitted.
4.	Problem solving/Coding using C, C++, Python, SCILAB, MATLAB, MS-EXCEL or any other relevant software	5 small coding based assignment of 2h each. Total = 10h	Based on the coding solution submitted.
5.	Self learning on-line course	Minimum duration of the course should be 10h.	Examination based assessment at the end of course. Based on the certificate produced.
6.	Complex problem solving	Maximum 2 problem. Study of the problem and solution finding, Total = 10h	Based on the depth of the solution submitted.
7.	Videos on Industrial safety aspects based on subject	Duration of video = 5h Report preparation = 5h Total = 10h	Based on quiz/report submitted
8.	Discussion on research paper based on relevant subject	5 research paper = 20 h	Summarize research paper and evaluation critical parameters

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9.	Poster/chart/power point preparation on technical topics	Duration = 6 h	Based on poster/chart preparation and presentation skills
10	Working/non-working model on technical topics	Working = 12 h Non- working = 8 h	Based on inter department/external evaluation
11	Industrial exposure for 2-3 days to observe and provide tentative solutions on society/environment/health/any other issue	Duration = 15 h for industrial exposure Problem identification and tentative solution = 10 h Total = 20 h	Based on evaluation of critical problems and solutions
12	Group Discussion on emerging/trending technical topics based on subject	Duration = 1 h each	Based on performance in group discussion, technical depth, knowledge etc.
13.	Real world case studies-based learning	Duration of data collection/study = 5h Report preparation = 5h Total = 10h	Based on in-depth study, technical depth, data collected, fact finding, etc.
14.	Application/Software development	Duration = 10 h	Depending on the complexity of the Application/Software

Note:

1. All the suggested activity should be related to the subject.
2. The number of hours are suggestive. Faculty can sub-divide the number of hours based on the activity. However, total number of hours is fixed.
3. Rubrics for the evaluation can be prepared by the faculty.

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