



GOVERNMENT OF TAMILNADU  
DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI-25  
**STATE PROJECT COORDINATION UNIT**

*(Established under Canada India Institutional Cooperation Project)*

**CURRICULUM**

|                              |                                                                                                                                                                                                                                                                                                             |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Course Name                  | <b>PCB DESIGNING</b>                                                                                                                                                                                                                                                                                        |
| Course Code                  | <b>EC/2020/014</b>                                                                                                                                                                                                                                                                                          |
| Course Duration              | 50 Hours                                                                                                                                                                                                                                                                                                    |
| Minimum Eligibility Criteria | 10 <sup>th</sup> /+2 /ITI/Diploma/Graduate                                                                                                                                                                                                                                                                  |
| Pre-requisites (if any)      | -                                                                                                                                                                                                                                                                                                           |
|                              |                                                                                                                                                                                                                                                                                                             |
| Course Objectives            | Training module has been designed for the participants to <ul style="list-style-type: none"> <li>• Understand the concept and classification of PCB Board</li> <li>• Understand the steps involved in PCB Design.</li> <li>• Familiarize Schematic and layout design flow using design software.</li> </ul> |
|                              |                                                                                                                                                                                                                                                                                                             |
| Course Outcomes              | At the end of training, the trainees will be able to <ul style="list-style-type: none"> <li>• Designschematic and layout of PCB for analog circuits, digital circuitsand mixed circuits.</li> <li>• Generate Gerber file for PCB Layout</li> <li>• Fabricate simple circuit using PCB</li> </ul>            |
|                              |                                                                                                                                                                                                                                                                                                             |
| Expected Job Roles           | PCB Designer                                                                                                                                                                                                                                                                                                |

| TEACHING AND SCHEME OF EXAMINATION |               |           |    |                  |     |                         |
|------------------------------------|---------------|-----------|----|------------------|-----|-------------------------|
| Course Code                        | Course Name   | Hours     |    | Assessment Marks |     | Duration of Examination |
|                                    |               |           |    | Min              | Max |                         |
| EC/2020/014                        | PCB DESIGNING | Theory    | 20 | 10               | 20  | 3 Hours                 |
|                                    |               | Practical | 30 | 40               | 80  |                         |
|                                    |               | Total     | 50 | 50               | 100 |                         |

**EC/2020/014- PCB DESIGNING**  
**DETAILED SYLLABUS**

| Unit No                        | Modules                                                                                        | No.of.Hours |           |
|--------------------------------|------------------------------------------------------------------------------------------------|-------------|-----------|
|                                |                                                                                                | Theory      | Practical |
| I                              | Introduction to PCB                                                                            | 15 Hours    |           |
| 1.1                            | Introduction of Basic Electronics                                                              | 07          | 08        |
| 1.2                            | Evolution of PCB, Components of PCB, Classification of PCB                                     |             |           |
| 1.3                            | General PCB Design consideration                                                               |             |           |
| 1.4                            | Installation of software – Component placing rules , Conductor pattern – Rooting consideration |             |           |
| 1.5                            | Rules for PCB Track                                                                            |             |           |
| II                             | PCB Layout Design                                                                              | 20 Hours    |           |
| 2.1                            | PCB Layers                                                                                     | 08          | 12        |
| 2.2                            | Layout Design, Layout design checklist                                                         |             |           |
| 2.3                            | Design rules for digital and analog circuits                                                   |             |           |
| 2.4                            | Rooting and Tracing                                                                            |             |           |
| 2.5                            | Environmental Factors                                                                          |             |           |
| III                            | Fabrication of PCB                                                                             | 15 Hours    |           |
| 3.1                            | Gerber file creation for your Board file                                                       | 05          | 10        |
| 3.2                            | Fabrication process &Fabrication techniques                                                    |             |           |
| 3.3                            | Mini Project: Any three                                                                        |             |           |
| 3.4                            | Identifying the problems and solution                                                          |             |           |
| Total theory / Practical Hours |                                                                                                | 20          | 30        |
| Total hours                    |                                                                                                | 50          |           |

### HARDWARE REQUIREMENT

| S.NO | LIST OF TOOLS /EQUIPMENTS |
|------|---------------------------|
| 1    | PC/Laptop                 |

### SOFTWARE REQUIREMENT

| S.NO | LIST OF SOFTWARE    |
|------|---------------------|
| 1    | PCB Design Software |

### REFERENCE BOOKS

| S.NO | NAME OF THE BOOK                                                  | AUTHOR                   | PUBLISHER     |
|------|-------------------------------------------------------------------|--------------------------|---------------|
| 1    | Printed Circuit Board Designer's Reference: Basics                | Christopher T. Robertson | Prentice Hall |
| 2    | Printed Circuit Boards: Design and Technology                     | Walter C Bosshart        | TMH           |
| 3    | Printed Circuit Boards: Design, Fabrication, Assembly and Testing | R. S. Khandpur           | TMH           |

### ASSESSMENT AND CERTIFICATION

| S.No | Criteria for assessment                                                                                                                                                                                                                                    |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the CIICP Project Polytechnic College for a duration of 3 hours                                                                    |
| 2.   | A trainee must have 75% of attendance to appear for End examination in Theory and Practical.                                                                                                                                                               |
| 3.   | The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 word/objective type questions)                                                                                               |
| 4.   | The assessment for practical part will be based on the marks scored in the end examination conducted by the CIICP Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic. |
| 5.   | The passing criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.                                                                                                                 |
| 6.   | On successful completion of training, certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.                                                                                           |

### END EXAMINATION

### ALLOCATION OF MARKS

| S.NO               | Description                             | Max. Marks |
|--------------------|-----------------------------------------|------------|
| 1.                 | Theory Examination                      | 20         |
| 2.                 | Practical Examination                   |            |
|                    | a)Objective and Layout                  | 20         |
|                    | b)Procedure and Connections / Execution | 20         |
|                    | c)Result and Viva                       | 20         |
|                    | d)Record                                | 20         |
| <b>Total Marks</b> |                                         | <b>100</b> |

## **THEORY MODEL QUESTION PAPER**

**EC/2020/014 PCB DESIGNING**

**(Maximum Marks: 20)**

**(N.B: Answer any Twenty questions)**

**20x1= 20 Marks**

1. Expand PCB.
2. What is unit of Resistance?
3. Write any two types of PCB Board.
4. Write any two Semiconducting Devices.
5. Write any two Name of PCB Design Software.
6. Draw the symbol of inductor.
7. What is the use of PCB Design?
8. Draw the symbol of Variable Capacitor.
9. Write any two Active Components.
10. Write any two Passive Components.
11. Expand SCR.
12. What are the application of Diode?
13. What is Single layer PCB?
14. What is Multilayer PCB?
15. What is High-frequency PCBs?
16. What is the PCB Board Connecting Material?
17. What is the use of Flexible PCBs?
18. What is the use of Flex-rigid PCBs?
19. Write any two differences between Flexible PCBs and Flex-rigid PCBs
20. What Is Need For A PCB?
21. What are the advantages of double layer PCBs?
22. Write the different application of PCB?
23. Write the advantage of PCB?
24. Write the disadvantage of PCB?
25. Difference between Normal board and PCBs?