Rayat Shikshan Sanstha's

Yashavantrao Chavan Institute of Science, Satara (Autonomous)

Department of Electronics

Revised Syllabus of Diploma Program (UG)

Embedded System Design

Preamble:

Diploma Course (UG) in is an integrated course in faculty of Electronics. This is a humble endeavor to initiate the process towards an era of knowledge. The students from Electronics field should also be competent for this change in the technology. In this year, a student will able to understand handling of laboratory equipment's, design embedded systems with confidence. In the subject, the student will also get a circuit designing and proper knowledge in the field of Embedded System design

Program Objectives of the Course:

1. To develop hands-on skills of students

2. To promote enterplanership among the students

3. To enhance technical knowledge

4. To increase employment opportunities of students

Program Outcomes:

At the end of this course, the students should be able to
1. Create, design and develop problem solving ability

2. Understand state of the art, technology and development

3. Develop soft skills needed.

4. Get knowledge of self employability.

Course Specific Outcomes:

At the end of this course, the students should be able to
1. Work as Electronic Engineer in Industry.

2. Establish Self Business .

I Year DiplomaCourse

(Keep one of above as per year)

1. Title: **Introduction to EDA Tools**
2. Year of Implementation: 2020
3. Duration:One Year
4. Pattern:Semester
5. Medium of Instruction: English
6. Contact hours: 7 hours/week
8. Structure of Course:

Syllabus Structure

Year	Semester	Course No.	Course Code	Contact Hours	Credits (1Credit=15 H)	Total Marks
1	I	CT I	DET 101	30	2	75
		CL I	DE L101	60	2	75
	II	CT II	DET 202	30	2	75
		CL II	DE L202	60	2	75
	Annual	CP I	DEP101	30	1	50
			Total	**210**	**9**	**350**
2	III	CT III	DET 303	30	2	75
		CL III	DE L303	60	2	75
	IV	CT IV	DET 404	30	2	75
		CL IV	DE L404	60	2	75
	Annual	CP II	DEP202	30	1	50
	Industrial and or Incubation and or Research and or Field Training			30	1	-
			Total	**240**	**10**	**350**
	V	CT V	DET 505	30	2	75
		CLV	DEL505	60	2	75
	VI	CT VI	DET 606	30	2	75
		CL VI	DEL606	60	2	75
	Annual	CP III	DEP303	60	2	100
	Industrial and or Incubation and or Research and or Field Training			30	1	-
			Total	**270**	**11**	**400**
			Total	**720**	**30**	**1100**

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Semester I

DET 101:Introduction to EDA Tools I

(Contact Hrs: 30 Credits: 2)

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Learning Objectives:

1. To Provide Factual Knowledge of electronic components.

2. To Comprehension with Electronics Design Using SPICE and PSPICE

Unit I: Basic Electricals and Electronics   15

Introduction: Types of components: Active Components: Diode, Transistor, MOSFET, LED, SCR, Integrated Circuits (Ics), Passive Components: Resistor, Capacitor, Inductor, Transformer, and Speaker/Buzzer

Concept of Schematic Designing

Brief Introduction of various simulators, Description to simulator tool, Hands on practice on available library of components, working through wiring and schematic designing.

Unit II: Introduction to Electronics Designing Using SPICE and PSPICE   15

Introduction to SPICE: Brief History, New Versions Representing Components, Understanding the SPICE Environment, Using Model Editor Designing a Circuit & doing Simulation

Designing and Simulating PSPICE

Understanding the PSPICE Environment, Using Model Editor, Using Magnetic Parts Editor, Using Stimulus Editor, Drawing a Circuit Preparation for Simulation: Preparing schematic for simulation, Understand the sources for simulation, Understand different markers

Learning Outcomes:

At the end of this course, the students should be able to,

1. Explain electronic components their working and application.

2. Describe Electronic design with SPICE and PSPICE

Reference Books:

1. Essential Electronic Design Automation (EDA), Mark.D.Birnbaum, Prentice Hall, 2004

2. Introduction ToPSpice Using OrCADfor Circuits and Electronics, Muhammad H. Rashid,Paperback – Import,3rd Edition, 2003.

3. Printed circuit Board – Design & Technology by Walter C. Bosshart, TMH.

4. Printed Circuit Board –Design, Fabrication, Assembly & Testing, R.S. Khandpur, TMH,3rd Edition,2017.

5. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky, PHI, 10th Edition, 2009.

6. Electronics text lab manual, Paul B. Zbar,1989

7. Basic Electronics & Linear circuits, N.N. Bhargava, D.C. Kulshresta& D.C Gupta-TMH,51 reprint,2008.

8. Electronic devices, David A Bell, Reston Publishing Company, 4th Edition, 2009.

10. "Printed circuits Handbook" Clyde F. Coombs, McGraw Hill, 3rdEdition,2015.

DEL101: **(Practical):Introduction to EDA tools Lab I**

(Hardware and Circuit Simulation Software)

(Contact Hrs: 60 Credits: 02)

Learning Objectives:

1. To learn Conceptual Knowledge Electronic component and simulation tools.

2. To learn Factual knowledge of SPICE and PSPICE

3. To analysis Electronics Design Using SPICE and PSPICE

4. To Create Electronic Circuit Using SPICE and PSPICE

List of Practical's (15)

1. Study of Basic Electronic components

2. Study of Packages types in Electronic Components

3. Introduction to Simulation tools

4. Study of SPICE environment

5. Designing a Circuit using SPICE

6.Study of Libraries of PSPICE

7. Simulating a Circuit using SPICE

8. Study of PSPICE environment

9. Designing a Circuit Schematic using PSPICE

10. Study of Simulation and Circuit Schematic using PSPICE

11. Study of markers in PSPICE

12. Study of PN junction diode characteristics

13. Study of RC integrator

14. Study of RC differentiator

15. Study of Astable Multivibrator.

Learning Outcomes:

After completion of the unit, Student is able to

1. Identify Electronic components and understand simulating tool

2. Explain SPICE and PSPICE EDA tools

3. Describe Electronics Circuit using SPICE and PSPICE

4. Demonstrate Electronic circuit simulation.

Reference Books:

1. Essential Electronic Design Automation (EDA), Mark.D.Birnbaum, Prentice Hall, 2004

2. Introduction ToPSpice Using OrCADfor Circuits and Electronics, Muhammad H. Rashid,Paperback – Import,3rd Edition, 2003.

3. Printed circuit Board – Design & Technology by Walter C. Bosshart, TMH.

4. Printed Circuit Board –Design, Fabrication, Assembly & Testing, R.S. Khandpur, TMH,3rd Edition,2017.

5. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky, PHI, 10th Edition, 2009.

6. Electronics text lab manual, Paul B. Zbar,1989

7. Basic Electronics & Linear circuits, N.N. Bhargava, D.C. Kulshresta& D.C Gupta-TMH,51 reprint,2008.

8. Electronic devices, David A Bell, Reston Publishing Company, 4th Edition, 2009.

10. "Printed circuits Handbook" Clyde F. Coombs, McGraw Hill, 3rdEdition,2015.

Semester II

DET 202: Introduction to EDA Tools II

(Contact Hrs: 30 Credits: 2)

Learning Objectives:

1. Understand the need for PCB Design and steps involved in PCB Design and Fabrication process

2. Familiarize with PCB Etching and Soldering

Unit I: PCB Designing Process 15

Trends in PCB Designing: Older PCB Method, PCB Designing Using Graph Paper, Making a hand drawn PCB, Using Computer for EDA General rules of Layout, Resistance, Capacitance and Inductance, Conductor Spacing, Supply and Ground Conductors, Component Placing and mounting, Cooling requirement and package density, Layout check. Basic artwork approaches, Artwork taping guidelines, General artwork rules: Artwork check and Inspection.

Film master preparation, Image transfer photo printing Properties of laminates, copper cladlaminates, materials of copper clad laminates, Types of Laminates, Manual cleaning process,Basic printing process for double sided PCB's, Photo resists, wet film resists, Coatingprocess for wet film resists, Exposure and further process for wet film resists, Dry film resists

Unit II: PCB Etching and Soldering 15

Introduction, Etching machine, plating techniques etching techniques, Etchant system, Exporting Drill and Gerber Files; Drills; Footprints and Libraries Adding and Editing Pins Principles of Solder Connection, Solder joints, Solder alloys, Soldering fluxes. Soldering, Disordering tools and Techniques, Mechanical Machining operations, Lead cutting and Soldering Techniques, Testing and quality controls.

PCB Technology: Trends, Environmental concerns in PCB industry.

Learning Outcomes:

After completion of the unit, Student is able to

1. Understand and Describe the steps involved in schematic, layout, fabrication and assembly process of PCB design.

2. Explain PCB Etching and Soldering

Reference Books:

1. Essential Electronic Design Automation (EDA), Mark.D.Birnbaum, Prentice Hall, 2004

2. Introduction ToPSpice Using OrCADfor Circuits and Electronics, Muhammad H. Rashid,Paperback – Import,3rd Edition, 2003.

3. Printed circuit Board – Design & Technology by Walter C. Bosshart, TMH.

4. Printed Circuit Board –Design, Fabrication, Assembly & Testing, R.S. Khandpur, TMH,3rd Edition,2017.

5. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky, PHI, 10th Edition, 2009.

6. Electronics text lab manual, Paul B. Zbar,1989

7. Basic Electronics & Linear circuits, N.N. Bhargava, D.C. Kulshresta& D.C Gupta-TMH,51 reprint,2008.

8. Electronic devices, David A Bell, Reston Publishing Company, 4th Edition, 2009.

10. "Printed circuits Handbook" Clyde F. Coombs, McGraw Hill, 3rdEdition,2015.

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DE L202: **(Practical):Introduction to EDA tools Lab II**
(Hardware and Circuit Simulation Software)

(Contact Hrs: 60 Credits: 02)

Learning Objectives:

1. To learn Factual knowledge of PCB board, it's soldering and disordering techniques.

2. To Conceptual Knowledge of Electronics Simulating Circuit using EDA Tool

3. To Comprehension with Electronics circuits Designing Using EDA Tool.

4. To Create and Develop Electronic Circuit Using EDA Tool.

List of Practical's (15)

1. Study of Printed Circuit Boards and its applications

2. Study of Soldering and Disordering Techniques

3. PCB Drilling and Assembly of components

4. Designing a general purpose PCB for bridge rectifier circuit

5. Designing a PCB using Graph Paper for bridge rectifier circuit

6. Designing of hand drawn PCB for bridge rectifier circuit

7. Study of Libraries of DipTrace

8. Schematic circuit design, creating layout tool and testing using DipTrace

9. Design schematic of a Half wave Rectifier using DipTrace

10. Design schematic of a Centre tapped full wave rectifier using DipTrace

11. Design schematic of a clipper circuit using DipTrace

12. Design schematic of a clamper circuit using DipTrace

13. Introduction of materials required for fabrication of PCB

14. Development and Etching of single layer PCB

15. Design, fabrication and testing of a 9 V power supply with Zener regulator

Learning Outcomes:

After completion of the unit, Student is able to

1. Understand PCB board, it's soldering and disordering techniques.

2. Design and Simulate Electronic circuits using EDA Tool

3. Develop Electronics circuits Designing Using EDA Tool.

4. Demonstrate Various Electronic circuits

Reference Books:

1. Essential Electronic Design Automation (EDA), Birnbaum2004, Birnbaum, Mark D., Prentice   Hall Modern Semiconductor Design, 2004

2. Introduction ToPSpice Using OrCAD For Circuits And Electronics, 3rd Edition 3rd Edition (English, Paperback, Muhammad H. Rashid)

3. Printed circuit Board – Design & Technology by Walter C. Bosshart, TMH.

4. Printed Circuit Board –Design, Fabrication, Assembly & Testing, R.S. Khandpur, TMH

5. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky, PHI

6. Electronics text lab manual, Paul B. Zbar.

7. Basic Electronics & Linear circuits, N.N. Bhargava, D.C. Kulshresta& D.C Gupta-TMH.

8. Electronic devices, David A Bell, Reston Publishing Company/DB Tarapurwala Publ.

9. Walter C. Bosshart "PCB DESIGN AND TECHNOLOGY" TMH 10. Clyde F. Coombs "Printed circuits Handbook" III Edition, McGraw Hill.

DEP101(Project):
(Contact Hrs.30, Credits: 1)

Every student should take up a project & submit in the report the work he/she has carried out. The project work will be assessed independently at the time of practical examination.

BOS Sub-Committee	**Expert Committee**

1. Mr. S.K. Shinde   Chairman
   Asst. Prof.
   YCIS, Satara (Autonomous)

1. Prof. Mr. M. L. Dongare   Member
   HOD Electronics,
   S.M. Joshi College, Pune.

2   Mr. S.D. Jadhav   Member
   Asst. Prof.
   YCIS, Satara (Autonomous)

2. Mrs. Pratiksha Kadam   Member
   Administrator at Technotronics Technologies
   LLP, Satara, Maharashtra