



RAGHU ENGINEERING COLLEGE (Autonomous)

(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUGV, Vizianagaram)
NBA and NAAC 'A+' grade accredited Institute.

Dakamarri, Bheemili Mandal, Visakhapatnam – 531162, A.P.

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INSTITUTE VISION

Envisioning to be a world class technical institution by synergizing quality education with ethical values.

INSTITUTE MISSION

- To encourage training and research in cutting-edge technologies.
- To develop and strengthen strategic links with the industry.
- To kindle the zeal among the students and promote their quest for academic excellence.
- To encourage extra-curricular activities along with good communication skills.

QUALITY POLICY

RAGHU Engineering College underscores ethical values along with innovative teaching through an interactive, activity-based pedagogy; establishes the best of infrastructural facilities, inculcates engineering temper among the students through the use of the latest Information and Communication Technologies, and strives for an efficient, responsive and transparent administration in all areas.

Department of Electronics and Communication Engineering

VISION

To grow into a premier engineering department with excellence in teaching, research, and innovation in the field of electronics and communication engineering at par with the global industrial standards catering to the needs of the stakeholders while keeping up with the advancing technology.

MISSION

- M1: To provide excellence in education, research and public services.
M2: To provide a creative environment through structured teaching and learning process.
M3: To impart employability-focused education while imbibing the spirit of entrepreneurship.
M4: To inculcate self-learning attitude, management skills and professional ethics.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- **PEO 1: Domain Knowledge:** - To have the knowledge and technical skills required to remain productive.
- **PEO 2: Communication Skills & Employability:** - To apply technical knowledge and skills as electronics and communication engineers to provide practical solutions in industrial and governmental organizations.
- **PEO 3: Life Long Learning & Social Concern:** - To achieve success with awareness of entrepreneurship skills and have the ability for lifelong learning by pursuing professional development to meet the emerging and evolving demands for a successful career.

MAPPING OF MISSION STATEMENTS WITH PEOs

MS/PEO	PEO 1	PEO 2	PEO 3
MS 1	3	2	2
MS 2	3	3	2
MS 3	3	2	3
MS 4	2	3	3

1-Slight, 2- Moderate, 3- Substantial

PROGRAM OUTCOMES

Graduates of Electrical and Electronics Engineering Will:

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PROGRAM SPECIFIC OUTCOMES (PSOs)	
PSO 1: Understand and apply the fundamental concepts of Basic and Engineering Sciences for appropriate up-skilling in the fast-emerging fields of Signal Processing, Image Processing, Communication, Networking, VLSI, Embedded Systems, Analog and Digital Technologies to meet the futuristic industrial achievements.	
PSO 2: Apply latest hardware and software tools to solve complex electronics and communication engineering problems along with analytical skills to derive appropriate solutions in the real time applications across varied business and administrative functions.	

Mapping of PEOs with POs and PSOs

PEO/ PO	PO -1	PO -2	PO -3	PO -4	PO -5	PO -6	PO -7	PO -8	PO -9	PO -10	PO -11	PO -12	PSO -1	PSO -2
PEO 1	3	3	3	2	2						1	1	3	1
PEO 2	2	3	3	2			2	2		3			3	3
PEO 3						1	1	1	1	2	1	3	3	1

1-Slight, 2- Moderate, 3- Substantial

2304502– PCB Designing

Programme & Branch	B. Tech & ECE	Sem	Category	L	T	P	Credits
Prerequisites	Nil	4	Skill Enhancement course	0	1	2	2

Course Objectives:

1. To discuss the basics of PCB designing
2. To familiarize design and fabrication techniques using modern tools
3. To study various PCB production techniques
4. To create/design libraries and footprints using ORCAD software
5. To apply and implement routing and post processing using ORCAD software.

Preamble:

The electronics and manufacturing industry with growth demands for skill set of the individual. With the competitive market, industrial needs and decreasing demand for work force, it is always advised to learn new things and have certain skill set under sleeves to work in industry. This course is designed to train students in Printed Circuit Board design.

Course Contents:

Unit-1	Basics of Printed Circuit Board designing	Contact Hours: 9
Fundamental of electronic components, basic electronic circuits, Basic terminology of PCB design, Layout planning, general rules and parameters, ground conductor considerations, thermal issues, check and inspection of artwork. Design rules for Digital circuit PCBs.		
Unit-2	Introduction to Electronic design automation (EDA) tools for PCB designing	Contact Hours: 9
Brief Introduction of various simulators, Selecting the Components Footprints as per design, Making New Footprints, Assigning Footprint to components, Net listing, PCB Layout Designing, Auto routing and manual routing.		
Unit-3	Introduction PCB production techniques	Contact Hours: 9
Photo printing, film master production, reprographic camera, basic process for double sided PCBs photo resists, Screen printing process, plating, relative performance and quality control, etching machines, Solders alloys, fluxes, soldering techniques, Mechanical operations, Multilayer PCBs.		

Unit-4	Getting Started & Library Development using ORCAD	Contact Hours: 9
Getting started with PCB Editor, Preparation of board for layout using board wizard, User interface, defining parameter of board (Constraint Manager), Different tools of Orcad/Allegro PCB Editor, Introduction to various DIP and Surface mount Component, preparing libraries/ Footprints), PAD stack Designing, Creating footprints for DIP and SMD Devices.		
Unit-5	Design Rules, Routing and Post Processing using ORCAD	Contact Hours: 9
Net listing/logic import from schematic to PCB, Component Placement, Manual routing, Different parameters for perfect routing, Finishing of routing (Glossing, unmitter), Introduction to copper pour for power plane, Checking the status of routing, Routing power track (VCC & GND), Reducing Crosstalk effect, Reducing EMI effect, Assigning specific text (silkscreen), Creating reports, Creating manufacturing data (GERBER) for design, Plotting of layout design for home production, Creating Pdf documentation.		
Total Hours: 45		
Text Books:		
1	Printed circuit board design, fabrication assembly and testing – R. S. Khandpur, Tata McGraw Hill, 2006.	
2	Complete PCB Design using OrCad Capture and PCB Editor – Kraig Mitzner, Bob Doe Alexander, Akulin Anton, Suponin Dirk Müller, Newnes (Elsevier), 2009.	
Reference Books:		
1	Printed Circuit Board Design and technology– Walter C. Bosshart, McGraw Hill, 2000.	
2	Printed Circuits Handbook–Clyde F. Coombs Jr., Happy T. Holden, McGraw Hill, Sixth Edition, 2016.	
Web References:		
1	https://www.youtube.com/watch?v=ZbxA90wbTZU	
2	https://www.youtube.com/watch?v=giEKigazwjk&list=PLZXak7K05JhZZ7hHYMOof0YkEUQ1BNegXJ	
COURSE OUTCOMES: Upon completion of the course, students shall have ability to		BT Mapped (Highest Level)
CO 1	Remember the basics of PCB designing.	L1
CO 2	Familiarize with the advance techniques and study modern tools for designing and fabrication of PCBs.	L2
CO 3	Understand about various PCB production techniques.	L2
CO 4	Apply ORCAD software to create/design libraries and footprints.	L3
CO 5	Implement the logic Import, Design Rules, Component Placement, Routing and Post Processing using ORCAD software.	L3

Mapping of Cos with POs and PSOs:

COs/ POs	PO -1	PO -2	PO -3	PO -4	PO -5	PO -6	PO -7	PO -8	PO -9	PO -10	PO -11	PO -12	PSO -1	PSO -2
CO 1	1	1	2	-	2	-	-	-	3	-	-	-	2	3
CO 2	1	2	2	-	3	-	-	-	3	-	-	-	2	3
CO 3	1	2	2	-	3	-	-	-	3	-	-	-	2	3
CO 4	2	3	3	2	3	-	-	-	3	-	-	-	3	3
CO 5	2	3	3	3	3	-	-	-	3	-	-	-	3	3
1 – Slight, 2 – Moderate, 3 – Substantial														