TECHZIG

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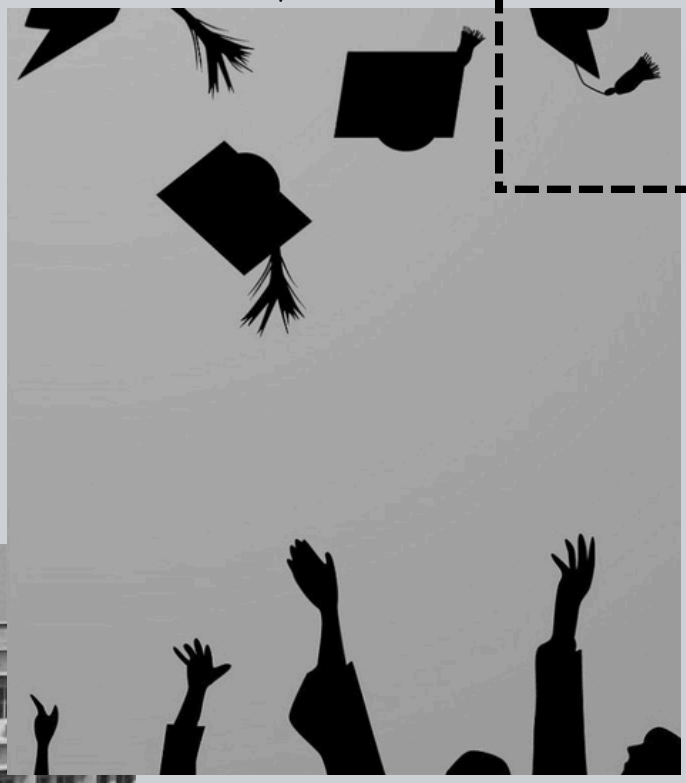
BHOJ REDDY ENGINEERING COLLEGE FOR WOMEN



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Department of Electronics & Communication Engineering

CONTENTS

VISION

ECE department envisions developing technically competent and meritorious women engineers with a keen sense of social responsibility.

MISSION

- To provide a challenging and value-based education, enriching knowledge of young engineers in the field of Electronics and Communication Engineering.
- To strive for the intellectual and personal development of young women to build a healthy society by improving the quality of life through the application of Electronics.
- To inculcate self-confidence, teamwork, leadership, and entrepreneurship in students through curricular, co-curricular and extracurricular activities.
- To develop adaptable thinking and the ability to apply the techniques of communication innovatively in a realistic environment for the current and future technological requirements.

About College

Bhoj Reddy Engineering College for Women is run by Sangam Laxmibai Vidyapeet, a registered voluntary social action group working since 1952 for empowerment of women and girls through education. The Vidyapeet has more than 60 years of experience in the field of education.

Founders of BRECW

College Campus

Sangam Laxmibai Vidyapeet is a voluntary social action group working for empowerment of women and girls. Registered under the Andhra Pradesh Societies Registration Act, It is a not-for-profit organization working in the field of education since 1952.

The Management of the Vidyapeet makes every effort to fulfill the vision of its founders KV Ranga Reddy, Sangam Laxmibai, M Bhoj Reddy, Bojjam Narsimhulu, Pasham Papaiah, A Shyamala Devi, P Lalitha Devi, B Ramdev, MH Guptha who are no more with us.

The College was established in 1997. It is managed by an executive committee consisting of persons with along experience in the field of education. Within a short period, it has emerged as one of the premier engineering colleges in the state.

The College campus has the unique advantage of being located in the heart of the city and yet free from noise and dust pollution. With considerable open space and greenery spread over 6.5 acers of land, the campus provides an ideal ambience for the engineering education of girls.

The academic performance of our students has been consistently outstanding with a pass percentage of 85 to 90.

The College Timings are 9:30 am to 4:30 pm. There will be 6 periods of 60 minutes duration in a day, with a lunch break of 60 minutes. The College attaches great importance to attendance and rewards students having good attendance. The college is firmly convinced that good attendance helps the students to perform well in their curricular, co-curricular and extra-curricular activities.

The College is offering the following undergraduate courses:

1. Computer Science & Engineering (CSE)
2. Computer Science & Engineering (AI & ML)
3. Electronics & Communication Engineering (ECE)
4. Electrical & Electronics Engineering (EEE)
5. Information Technology (IT)

Ramdev Indoor Auditorium

Digital Library

ECE Staff

Students of IEEE, ISTE IETE & ISOI

Infrastructure

All classrooms are equipped with LCD facilities for conducting lectures and presentations effectively. Tutorials are conducted regularly and, for this purpose, separate tutorial rooms are provided in each department. An open air theatre to accommodate more than 1200 is also available in the college campus. A full fledged 'Ramdev Indoor Auditorium' with a capacity of 300 will be ready for conducting curricular, co-curricular and extra-curricular activities.

Faculty

The college has able and committed faculty. The development of faculty is pursued vigorously on a continuous basis. The selection of faculty members is made every year by the JNTU selection committee through an open advertisement in the leading newspapers. The College encourages the faculty members to pursue higher studies and research by extending special facilities.

Academic Activities

The college has been in the forefront for organising various short-term courses, conferences, symposia, workshops, seminars and special lecturers.

Student Chapters

Presently, the college has students chapters, namely:

1. Institution of Electrical & Electronics Engineers (IEEE)
2. Indian Society for Technical Education (ISTE)
3. Institution of Electronics & Telecommunication Engineers (IETE)
4. Instrument Society of India (ISOI)

About Electronics & Communication Engineering

Electronics and Communication Engineering (ECE) is concerned with design, development, test and supervision of manufacturing of electronic equipment. Electronics has changed the entire world with its power of communication and micro-miniaturisation of devices like transistors, diodes, resistors.

ECE is a swiftly advancing field, with new ideas emerging every other minute. From mobile phones to fiber optics to remote sensing, there are exciting avenues to explore and create even better ideas. With technology becoming all pervasive in everyday life, opportunities for electronics and communications engineers are endless. The department has well-established labs as per the norms of JNTUH.

The scope of Electronics and Communication Engineering extends beyond traditional domains, encompassing cutting-edge technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and Quantum Computing. IoT has revolutionized the way devices communicate with each other, enabling smarter homes, cities, and industries. AI is transforming everything from healthcare to autonomous vehicles, making processes more efficient and intelligent. Quantum computing promises to solve complex problems at unprecedented speeds. ECE graduates are at the forefront of these technological advancements, driving innovation and pushing the boundaries of what is possible.

Furthermore, the interdisciplinary nature of ECE opens up numerous career opportunities in diverse fields. Graduates can find themselves working in telecommunications, aerospace, automotive, and healthcare industries, among others. They are also well-equipped to pursue research and development roles, contributing to groundbreaking discoveries and advancements. The demand for skilled electronics and communication engineers continues to grow, driven by the constant evolution of technology and the increasing reliance on electronic systems in all aspects of life. With a strong foundation in both theoretical knowledge and practical skills, ECE professionals are well-prepared to tackle the challenges of the future and contribute to the advancement of society.

As the digital era progresses, ECE professionals will play a crucial role in shaping the future of technology and innovation. Their expertise will be instrumental in developing sustainable solutions to global challenges, ensuring a better and more connected world for future generations.

Programme Outcomes of ECE

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 modelling 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 Education Objectives of ECE

PEO 1: Solve complex problems by using their expertise in analyzing and developing potential models using modern scientific tools.
PEO 2: Prioritize their professional development through interpersonal, leadership, and social skills, catering to the needs of society with ethics and integrity.
PEO 3: Exhibit sustained learning adapting to changing professional needs.

Program Specific Outcomes of ECE

PSO 1: Able to design, develop and analyse systems in the field of Electronics, Communications & Networking, Signal & Image processing, VLSI technology and Embedded systems.
PSO 2: Demonstrate expertise in the use of software and hardware required in real-life applications.

Principal

Dr G Shyama Chandra Prasad, Ph.D., LISTE., Principal

Dr. G. Shyama Chandra Prasad holds a Ph.D. in Computer Science and Engineering (CSE) from Jawaharlal Nehru Technological University, Hyderabad (JNTUH), and is a distinguished academician with over 25 years of teaching experience. He commenced his career in academia and has served at several reputed institutions. His areas of interest include image processing, neural networks, and machine learning. Dr. Shyama has published more than 50 research papers in various national and international journals and conferences. He has successfully supervised 10 postgraduate students and is currently supervising four Ph.D. scholars at Osmania University. Furthermore, two scholars have been awarded their Ph.D. degrees under his guidance at Osmania University. He serves as a reviewer for more than five reputed journals and is an active member of ISTE, contributing to knowledge exchange and professional development.

Principal Message

Dear Students,

Empowerment of girl students for their versatile progress through education is our cherished motto. BRECW is established to create, nurture, and shape technical professionals and leaders to create an inclusive and sustainable society in a national and international perspective. To achieve this vision, we launched undergraduate engineering degree programs that nurture many vibrant and promising professionals equipped with skills to face the ever changing social, economical and technical landscape of our country.

At BRECW, we provide high-end undergraduate education and research opportunities in new frontiers of Engineering and Technology with special focus towards Leadership & Innovation. Students are provided with opportunities for interaction with the experts from the Industry through Guest Lectures, Industrial Visits, Vocational Training (internships), Seminars and Workshops etc. To align with the curricula, we have excellent faculty, state-of-the-art infrastructure and laboratories. Spacious green campus, good library and peaceful atmosphere ensures that learning becomes a wonderful experience.

I firmly believe that our institute is more than just a place to learn. It gives you a chance to grow by equipping with everything you need to achieve excellence. At BRECW we ensure students to get the best start to their future career so that they could become smart and responsible citizens of our glorious country.

I wish all the students a grand success in their career and prosperity in their future life.

Head of Department

Dr J Madhavan, Ph.D., MISTE.,
HoD, ECE

Dr J Madhavan, an enthusiastic teacher and an administrator, has more than 20 years of experience in teaching, research, and institutional development. He has a vast research experience in Content Based Image Retrieval, Computer Vision and Pattern Recognition. He is specialized in Digital Image Processing, Digital Signal Processing, Microwave Engineering, Internet of Things etc. He has published more than 25 Research papers in refereed international journals and presented several papers in both national and international conferences. He has guided over 50 MTech students and 150 BTech students in the successful completion of their projects. He has given many guest lectures, seminars and organized many workshops, conferences, guest lectures and FDPs. He has been Editorial/Advisory Board member of Journals. He has also been a reviewer for some international conferences. He has served as a resource person, keynote speaker for some workshops and conferences.

HoD Message

Dear Students,

Today the country is in great need of technically sound graduates having a strong aptitude to work with zeal and fervour. Our college focuses on offering the best of the technical education for the overall development of the students. When you walk out of the campus, you can be competent enough in carrying out all your personal as well as social responsibilities.

Thanks to the Training and Placement Cell of our college which intends students be aware of the various job opportunities, imparts the necessary training and skills, and conducts campus interviews to recruit themselves in the final year of their graduation. It plays a crucial role in helping students to kick-start their career in their respective fields.

I am pleased that the students are well aware about all curricular, co-curricular and extra-curricular activities along with substantial emphasis on sports and cultural activities.

I wholeheartedly congratulate all the contributors and faculty members of the Magazine Committee on the successful publication of this magazine!

Facilities

Library

The Library and Information Centre (LIC), a gateway to knowledge resources, is making use of the latest advancements in the Information and Communication Technologies (ICT) to offer quality facilities to the students and staff of this college.

The LIC is fully automated through VTLS VIRTUA Integrated Library System Software with Sun Solaris Server from Sun Micro System, USA. All circulation activities are done through Bar Coding System.

It is exclusively housed on three floors with an area of 1800 sqm. Internet Section, Digital Library, Circulation Counter, Periodical Sections are housed in one floor. The Reading Halls, Loan Section, Competitive Exams Cell and Reference Sections are housed on two floors. The reading halls accommodate more than 150 students and provide peaceful and friendly atmosphere for absorbing the knowledge available through books, journals, e-sources, etc.

It is institutional member of British Library to provide international standard services of IELTS, TOEFL, GRE examinations, communication skills, placements, etc. in UK to students.

Apart from this, it provides Current Awareness Services, Selective Dissemination of Information, News Paper Clipping Service and Reprographic Service. The College also provides fiction and nonfiction books to inculate reading habits among the students.

Timings: 9:30 am to 5:00 pm

Internet Centre: Our Institution is one of the few institutes to posses 10Mbps leased line from BSNL for Internet connectivity with 67 desktops. Each department, sectional library is connected with Internet. The students and staff of the college have free access to Internet.

Website: The college maintains a website, www.brecw.ac.in, which provides up to date information about the management, departments, faculty and laboratories. Parents can visit the website for the latest information about the college, student attendance and performance.

Library

Sports & Games

The Outdoor games facilities include a 200 mts track with Basket Ball, Volley Ball, Throw Ball, Tennikoit and Shuttle badminton courts, while the indoor games facilities include Table Tennis, Carroms and Chess.
Inter Engineering Games Meet for Women students are conducted every year.
Our students bring laurels to the college in JNTUH Inter Engineering Collegiate Tournament every year.
Many students represented JNTUH in All India Inter University Championships held in various colleges platforms across the country.
The Management of the college encourages the students by giving cash awards for the university players as well as the winners in JNTUH Inter Engineering Collegiate Tournaments.


Sports Ground

Other Facilities

- All the classrooms are facilitated with DLP projectors, Thin Clients and Green Glass Board.
- All Computer Labs are facilitated with Computers, White board, DLP Projector and Internet.
- Central Library and Digital Library.
- Well-equipped and state-of the art laboratories as per the norms specified by JNTUH and AICTE.
- Ramdev Convention Centre.
- Open Air Auditorium.
- Seminar Hall.
- 100 Kwp Solar power plant and Generator.
- Lift and Water purifiers.
- Individual Locker Facility for Students.
- Sports & Games.
- Separate Parking for 2-wheeler and 4-wheeler.
- Canteen and Stationery.
- Banking facility is available within the campus for convenience of students and staff.
- Sponsoring educational society is a non-profit organization.
- Wheel Chair for Physically Challenged.

Faculty Contributions

List of Workshops/FDP/Refresher Courses attended by faculty

Dr J Madhavan-Professor & Principal

- 1 week FDP on “Innovative approaches to Cyber Security and Digital Forensics: Tools, Techniques and Best Practices” by ATAL AICTE, New Delhi (16 to 21 January 2025)

S Manjula-Associate Professor & HoD

- **1** week online STTP on “IPR, Patents, Design, Copyright, Trademarks, & Geographical Induction” by VPM’s Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra (01 to 07 January 2025)

B Jyothsna-Associate Professor

- 1 week online STTP on “IPR, Patents, Design, Copyright, Trademarks, & Geographical Induction” by VPM’s Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra (01 to 07 January 2025)

G Srilakshmi-Associate Professor

- 1 week online STTP on “IPR, Patents, Design, Copyright, Trademarks, & Geographical Induction” by VPM’s Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra (01 to 07 January 2025)

J Stella Mary-Associate Professor

- 1 week online STTP on “IPR, Patents, Design, Copyright, Trademarks, & Geographical Induction” by VPM’s Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra (01 to 07 January 2025)

Kazi Nikhat Parvin-Associate Professor

- Faculty Development Programme on “AI/ML Approaches for Efficient VLSI Circuit Designs” by EICT Academy IIT Roorkee in association with Jaypee Institute of Information Technology, Noida (02 to 13 January 2025)

Radhika Rayeekanti-Associate Professor

- 1 week online STTP on “IPR, Patents, Design, Copyright, Trademarks, & Geographical Induction” by VPM’s Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra (01 to 07 January 2025)

Dr K Ashok Kumar-Associate Professor

- “SMART Communication in IoT: Security & Future Applications and Possibilities” by St.Joseph College of Engineering (24 February to 01 March 2025)
- “Next Gen Communications for IoT and Industrial Automation” by Holy Mary Institute of Technology & Science (20 to 25 January 2024)
- “Generative AI: Techniques, Tools, and Applications” by National Institute of Technology, Delhi (03 to 08 February 2024)
- “AI and ML applications to Renewable Energy Systems and Electrical Vehicles” by Methodist College of Engineering & Technology, Hyderabad (20 to 24 January 2025)

P Suresh Kumar-Associate Professor

- One-week online STTP on “IPR, Patents, Design, Copyright, Trademarks, & Geographical Induction” by VPM’s Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra (01 to 07 January 2025)

K Srinidhi Reddy-Assistant Professor

- One-week online STTP on “IPR, Patents, Design, Copyright, Trademarks, & Geographical Induction” by VPM’s Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra (01 to 07 January 2025))

S Surekha-Assistant Professor

- One-week online STTP on “IPR, Patents, Design, Copyright, Trademarks, & Geographical Induction” by VPM’s Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra (01 to 07 January 2025)

SVMG Phani Kumar C-Assistant Professor

- Two-Week FDP on “Advanced optimization Techniques using MATLAB” by Electronics & ICT Academies MNIT Jaipur, IIITDM Jabalpur, IIT Roorkee, IIT Guwahati, NIT Patna, & NIT Warangal (17 to 28 February 2025)
- One-Week FDP on “Novel Beamforming and MIMO Antenna Design for 5G/6G Application Employing Time Modulation Techniques” by NIT, Warangal (10 to 16 March 2025)

B Eleena-Assistant Professor

- One-week online STTP on “IPR, Patents, Design, Copyright, Trademarks, & Geographical Induction” by VPM’s Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra (01 to 07 January 2025)

G Ranjitha-Assistant Professor

- One-Week Faculty Development Program on “Analog IC Design for Industrial Applications”, by Department of ECE, CVR College of Engineering, Hyderabad (25 to 29 March 2025)

N Sony-Assistant Professor

- One-Week FDP on “Next-Gen Communications for IoT and Industrial Automation” by Holy Mary Institute of Technology and Science, Hyderabad (20 to 25 January 2025)
- One-Week ATAL FDP on “IoT in Health Care”, by Keshav Memorial Institute of Technology, Hyderabad (10 to 15 February 2025)
- One-Week FDP on “Next-Gen Communication and IoT: Advancing the Connected Future” by Shadan College of Engineering and Technology, Hyderabad (25 to 30 August 2025)

K Virija-Assistant Professor

- One-Week FDP on “Practical Insights into RF System Design” by Marathwada Mitra Mandal’s College, Pune (06 to 11 January 2025)
- One-Week FDP on “Next-Gen Communications for IoT and Industrial Automation” by Holy Mary Institute of Technology and Science, Hyderabad (20 to 25 January 2025)

The Interview Chronicles

A Milestone in My Career

Hello Everyone, My name is K Geetha Vani, IV ECE A

I am happy to share that I have been placed at INFOSYS as a System Engineer. My interview experience at Infosys was both insightful and encouraging, giving me an opportunity to demonstrate my technical knowledge, problem-solving skills, and clarity of thought. The selection process consisted of two rounds: Aptitude Round and Technical + HR Interview Round. The aptitude round mainly tested logical reasoning, quantitative ability, and verbal skills. With proper practice and time management, I was able to clear this round successfully.
The interview round primarily focused on the projects I have completed, both mini and major projects. The interviewer showed keen interest in understanding my role, the technologies used, challenges faced, and how I approached problem-solving. Along with project discussion, the interview also assessed my communication skills, confidence, and attitude towards learning.

Questions asked in the interview were:

- Tell me about yourself.
- Why Infosys?
- You got opportunities from other companies too. How do you choose a company to work for?
- Will you be able to work under pressure?
- Explain your mini project in detail.
- Explain your major project and your specific contribution.
- What difficulties did you face while doing your projects and how did you overcome them?
- Do you have any questions for us?

Overall, the interview was interactive and knowledge-oriented. The interviewer was friendly and gave me enough time to explain my answers clearly. I realized that having a strong understanding of your own projects and being honest about what you know plays a very important role in interviews. Confidence, clear communication, and a positive mindset helped me perform well.
This experience taught me that every interview is not just an evaluation, but also a learning opportunity. I would like to suggest that students focus on strengthening their fundamentals, gaining hands-on project experience, and improving communication skills. These aspects greatly help in placement preparation.

Lastly, I am thankful to BRECW Placement Cell, my faculty members, and my friends for their constant support and guidance throughout this journey. This is about my interview experience.

Thank you!

K Geetha Vani
IV ECE A

A Moment of Achievement

Hello Everyone, I'm Bhashyakarla Sindoori, IV ECE B

I am pleased to share that I have been placed at Infosys in the role of System Engineer through the campus recruitment drive. Infosys is one of the most reputed IT companies, and getting selected through its campus hiring process was a proud and memorable moment in my academic journey. The selection process consisted of two rounds: an online test followed by a combined Technical and HR interview. The online test included sections such as reasoning ability, technical ability, verbal ability, pseudo code, numerical puzzles, and English skills. The interview focused on my programming fundamentals, core subject knowledge, communication skills, and career goals. Although I was nervous initially, my preparation helped me perform confidently. Getting selected at Infosys is a proud milestone and a great start to my professional career.

Questions asked in the interview were:

- Introduce yourself.
- As you're from ECE background, why are you opting for a software job?
- Why INFOSYS?
- What if you get a job in your domain in future?
- Where do you see yourself in next few years?
- Do you know the Excel Sheet functions?
- What all the programming languages you know?
- What are the names of your core subjects?
- What is the difference between a computer processor and a Microprocessor?
- What is the difference between a Microprocessor and a Microcontroller?
- Explain about your Academic Projects?
- How do you manage if someone from you team/group is not cooperating and helping you in the project?
- Do you have any queries for me?

Every interview experience teaches us valuable lessons and helps us grow both personally and professionally. On the day of the interview, I felt very nervous, as facing interviews always brings pressure and uncertainty. However, once the interview began, I gained confidence and answered the questions calmly based on my knowledge and preparation. After completing the interview, I felt satisfied and hopeful about my performance. When the results were announced and I was selected, I felt extremely happy and proud of myself. This experience made me realize the importance of strong communication skills, as they play a major role in boosting confidence during interviews.

I am grateful for the support and guidance provided by the BRECW Placement Cell, which helped me achieve this milestone. This experience has motivated me to work harder and aim higher in my career.

That's all about my interview experience.

Thank you!

B Sindoori
IV ECE B

My Placement Journey

Hello Everyone, My name is Vishalakshi, IV ECE B

I am happy to share that I have been placed at Trysol Global Services Pvt. Ltd. under the Python Technology role. My overall experience with the company during the recruitment process was very positive and informative, giving me valuable exposure to both technical and communication skills. The interview process consisted of three rounds: Group Discussion, Level 1 Technical Round, and Level 2 Technical Round. The Group Discussion helped in evaluating my communication skills, confidence, teamwork, and ability to express ideas clearly. It was a good platform to understand how discussions are handled in a professional environment.
Getting selected at Trysol Global Services Pvt. Ltd. has been a great learning experience and an important milestone in my career. This opportunity has motivated me to further enhance my technical skills and grow as a professional in the field of Python development.

Questions asked in the interview were:

- Group Discussion topic: Pros and Cons of Social Media.
- I was selected in the GD round for presenting unique points with clarity.
- How do you read a CSV file in Python?
- Write programs for Fibonacci series, vowel count, and palindrome check.
- Explain list comprehension and inheritance.
- Difference between list, set, and tuple.
- Mutable vs Immutable objects.
- What is __init__ method, class method, and static method?
- Explain lambda functions, decorators, and file handling.
- Basic SQL queries using WHERE, GROUP BY, HAVING clauses.
- Aggregate functions and finding the second highest salary.
- Primary key vs Unique key.
- DELETE vs TRUNCATE.
- Joins and Subqueries.
- Explain your project in detail.
- How did you implement your technical skills in your project?

The interviewers initially made us feel comfortable and then began asking questions. The questions were challenging, but the focus was not only on technical knowledge, but also on communication skills, attitude, and behavior. The interviewers were professional and friendly throughout the process.

Every interview is an opportunity to learn and grow. This experience helped me understand the importance of strong fundamentals, clear communication, and confidence during interviews. I am thankful to the BRECW Placement Cell for providing this opportunity.

Thank you!

N Vishalakshi
IV ECE B

Student Articles

Wireless Communication Technologies: From 4G to 5G

A Manogna
IV ECE A

Wireless communication has evolved rapidly over the past few decades, enabling faster data transmission and supporting the growing demand for mobile connectivity. The transition from 4G to 5G marks a significant milestone in this evolution, bringing major improvements in speed, latency, and network capacity. This advancement supports emerging technologies such as high-definition video streaming, real-time communication, smart devices, and next-generation applications, ensuring seamless connectivity and enhanced user experience across various sectors.

4G (Fourth Generation) technology, based on Long Term Evolution (LTE), revolutionized mobile communication by providing high-speed internet access, seamless video streaming, and reliable voice services. It marked a major shift from traditional voice-based communication to data-centric services. With 4G, users experienced faster download and upload speeds, improved call quality through VoLTE, and better support for multimedia applications. It enabled services such as video conferencing, online gaming, social media platforms, and cloud-based applications, which became an essential part of daily life. The widespread adoption of smartphones and mobile applications was largely driven by the capabilities of 4G networks.

However, with the rapid growth of mobile users and the increasing number of connected devices, the limitations of 4G technology gradually began to surface. Issues such as higher latency, limited bandwidth, and network congestion became more noticeable, especially in densely populated areas. Applications requiring real-time data transfer, such as virtual reality, autonomous systems, and smart infrastructure, demanded better performance than what 4G could offer. These challenges created the need for a more advanced wireless communication system.

To overcome these limitations, 5G (Fifth Generation) wireless technology was introduced. 5G provides extremely high data rates, reaching up to several gigabits per second, along with ultra-low latency, high reliability, and improved energy efficiency. It operates across a wide range of frequency bands, including sub-6 GHz and millimeter-wave (mmWave) frequencies, enabling efficient spectrum utilization and higher network capacity. Advanced technologies such as massive MIMO, beamforming, and network slicing significantly enhance network performance and allow customized services for different applications.

The impact of 5G extends far beyond smartphones and mobile internet. It plays a crucial role in enabling emerging technologies such as the Internet of Things (IoT), autonomous vehicles, smart cities, remote healthcare, augmented and virtual reality, and industrial automation. Compared to 4G, 5G can support a massive number of connected devices simultaneously, making it ideal for future smart and connected environments.

In conclusion, the evolution from 4G to 5G represents a transformative step in wireless communication. It not only improves existing services but also opens the door to innovative applications, driving technological growth and shaping a more connected and intelligent world.

Artificial Intelligence and Machine Learning Applications in ECE

P V Jyothirmayee
IV ECE B

Artificial Intelligence (AI) and Machine Learning (ML) are transforming the field of Electronics and Communication Engineering (ECE) by enabling intelligent systems that can learn, adapt, and make decisions. With the rapid growth of data, computing power, and advanced algorithms, AI and ML have become integral to modern electronic and communication systems, improving efficiency, accuracy, and automation. These technologies allow systems to analyze complex patterns, predict outcomes, and optimize performance in real time across various engineering applications.

In communication systems, AI and ML play a significant role in signal processing and wireless communication. Machine learning algorithms are used for channel estimation, interference management, modulation classification, and adaptive resource allocation. In emerging wireless technologies such as 5G and beyond, AI helps optimize network performance through intelligent spectrum management, beamforming, and predictive maintenance. These techniques enhance data rates, reduce latency, and improve overall Quality of Service (QoS), ensuring reliable and efficient communication even in dense network environments.

In the domain of VLSI and hardware design, AI is increasingly used to automate complex design processes. ML models assist in design space exploration, power optimization, fault detection, and yield prediction. By analyzing large volumes of design and fabrication data, AI-driven tools help engineers identify errors early and reduce development time. This leads to faster, more reliable, and cost-effective integrated circuit design while supporting advanced semiconductor technologies.

AI and ML also have a strong impact on embedded systems and the Internet of Things (IoT). Smart embedded devices equipped with ML algorithms can perform real-time decision-making, enabling applications such as smart homes, wearable health monitors, industrial automation, and smart agriculture. Edge AI, where data processing occurs locally on devices, reduces latency and dependence on cloud connectivity while improving privacy and energy efficiency, making systems more responsive and scalable.

In image and video processing, AI-based techniques such as deep learning and convolutional neural networks (CNNs) are widely used for object detection, face recognition, surveillance systems, and autonomous vehicles. These applications rely heavily on ECE concepts like sensors, cameras, signal processing, and communication interfaces. Similarly, in speech and audio processing, ML algorithms enable voice recognition, noise cancellation, and natural language-based human–machine interaction, improving user experience.

AI and ML are also applied in control systems and robotics, where they improve system stability, adaptive control, and autonomous decision-making. Intelligent controllers can learn from system behavior and adjust parameters in real time, making them suitable for applications such as drones, robotic arms, and autonomous navigation systems.

In conclusion, Artificial Intelligence and Machine Learning are redefining the scope of Electronics and Communication Engineering. By integrating intelligence into electronic systems and communication networks, AI and ML enable innovative solutions across industries. As technology continues to advance, ECE engineers with strong knowledge of AI and ML will play a crucial role in shaping the future of smart and connected systems.

Internet of Things (IoT) and Its Impact on Smart Systems

S Harika
III ECE A

The Internet of Things (IoT) refers to a network of physical devices embedded with sensors, software, and communication technologies that enable them to collect and exchange data over the internet. IoT has become a key technology in modern engineering, especially in the development of smart systems, where devices operate intelligently with minimal human intervention. It connects everyday objects, enables real-time monitoring, supports automation, and improves efficiency across applications such as homes, industries, healthcare, transportation, and smart infrastructure.

In smart systems, the Internet of Things (IoT) enables real-time data collection and continuous monitoring, which forms the foundation for intelligent decision-making. Sensors collect information such as temperature, humidity, motion, pressure, and light intensity, and this data is transmitted to processing units or cloud platforms through communication networks. This data-driven approach allows smart systems to analyze environmental conditions, detect changes, and automatically take appropriate actions without human intervention. For example, in smart homes, IoT is used to control lighting systems, security cameras, door locks, and energy usage, improving comfort, safety, and energy efficiency.

IoT plays a major role in the development of smart cities, where interconnected systems help manage traffic flow, street lighting, waste management, water distribution, and public safety. IoT-based traffic monitoring systems reduce congestion by optimizing signal timings, while smart street lights adjust brightness based on movement and daylight conditions. By using IoT sensors and reliable communication networks, city administrators can reduce energy consumption, improve infrastructure management, and enhance the overall quality of life for citizens.

Similarly, in smart healthcare, IoT devices such as wearable sensors, smart medical equipment, and remote monitoring systems track patient health parameters like heart rate, blood pressure, and oxygen levels in real time. These systems enable early diagnosis, continuous patient monitoring, and faster medical response, especially for elderly patients and those with chronic illnesses.

In industrial environments, IoT forms the backbone of smart manufacturing and Industry 4.0. Connected machines and industrial sensors enable predictive maintenance by identifying faults before they cause failures. This reduces downtime, increases productivity, and lowers operational costs. In agriculture, IoT-based smart systems monitor soil moisture, weather conditions, and crop health, helping farmers optimize irrigation, reduce resource wastage, and increase crop yield.

From an ECE perspective, IoT integrates core concepts such as sensors, embedded systems, microcontrollers, wireless communication, and signal processing. Technologies like Wi-Fi, Bluetooth, Zigbee, LoRa, and cellular networks are widely used for data transmission. However, challenges such as security, data privacy, scalability, and power consumption must be carefully addressed.

In conclusion, the Internet of Things has a significant impact on smart systems by enabling automation, efficiency, and intelligent decision-making. As IoT continues to evolve, it will play a vital role in building smarter, more connected, and sustainable systems across various domains.

VLSI Design Challenges and Its Role in Modern Integrated Circuits

B Siri
III ECE B

Very Large Scale Integration (VLSI) refers to the process of integrating millions or even billions of transistors onto a single semiconductor chip. VLSI technology plays a crucial role in the development of modern integrated circuits (ICs), enabling compact, high-performance, and energy-efficient electronic systems used in computers, smartphones, communication devices, and embedded systems. It supports advanced functionalities, faster processing speeds, reduced power consumption, and cost-effective mass production of complex electronic systems.

One of the major roles of VLSI in modern ICs is miniaturization. As transistor sizes shrink with each technology node, more functionality can be packed onto a single chip, leading to higher processing power and reduced cost per function. This scaling has enabled the development of compact and efficient electronic devices with enhanced capabilities. VLSI enables the design of complex systems such as microprocessors, memory chips, system-on-chip (SoC), and application-specific integrated circuits (ASICs), which form the backbone of today's digital world. These integrated solutions support high-speed computing, real-time data processing, and energy-efficient operation across various applications including consumer electronics, telecommunications, and automotive systems.

Despite its advantages, VLSI design faces several challenges. One key challenge is power consumption. As transistor density increases, managing power dissipation and heat generation becomes critical, especially in high-performance and portable devices. Excessive power leads to thermal issues that affect reliability and performance. Designers must focus on low-power design techniques such as voltage scaling, clock gating, power-aware architectures, and dynamic power management to minimize energy consumption without compromising functionality.

Another major challenge is design complexity. Modern ICs involve billions of transistors and require advanced Electronic Design Automation (EDA) tools for simulation, verification, synthesis, and layout. Ensuring design correctness, timing closure, and signal integrity across such complex designs is a difficult and time-consuming task. Moreover, manufacturing variations and process uncertainties at nanoscale dimensions can significantly impact chip performance, yield, and reliability, requiring robust design-for-manufacturability techniques.

Additionally, reliability and testing are significant concerns in VLSI design. As circuits become smaller, they are more sensitive to noise, aging effects, radiation, and defects. Advanced testing strategies such as built-in self-test (BIST) and fault-tolerant design approaches are essential to ensure long-term reliability. Security has also emerged as a critical challenge, as modern ICs must be protected against hardware attacks, data breaches, and intellectual property theft.

In conclusion, VLSI plays a vital role in shaping modern integrated circuits by enabling high performance, compact size, and advanced functionality. Although it presents several design challenges, continuous advancements in semiconductor fabrication technology, design methodologies, and automation tools are driving innovation in VLSI. As a result, VLSI remains a key pillar of modern electronics and communication systems, supporting the growing demand for smarter and faster technologies.

Working and Applications of Analog and Digital Communication Systems

S Anvitha
II ECE A

Communication systems are designed to transmit information from a sender to a receiver through a communication channel. Based on the nature of the transmitted signal, communication systems are broadly classified into analog and digital communication systems. Both play an important role in modern electronics and communication engineering. They enable efficient exchange of voice, data, and multimedia information and form the foundation for technologies such as broadcasting, telecommunication networks, and wireless communication systems used in everyday life.

In an analog communication system, the information signal is continuous in nature and varies smoothly with time. The working of an analog system involves signal generation, modulation, transmission, reception, and demodulation. Common analog modulation techniques include Amplitude Modulation (AM), Frequency Modulation (FM), and Phase Modulation (PM). Analog communication systems are simple in design and are mainly used in applications such as radio broadcasting, television transmission, landline telephones, and audio communication systems. However, analog systems are more susceptible to noise and signal distortion during transmission, which affects signal quality over long distances.

In contrast, a digital communication system transmits information in the form of discrete binary signals (0s and 1s). The working of a digital system involves sampling, quantization, encoding, digital modulation, transmission, decoding, and reconstruction of the original signal. Common digital modulation techniques include ASK, FSK, PSK, and QAM. Digital communication systems offer better noise immunity, higher reliability, and efficient data transmission compared to analog systems, making them suitable for long-distance and high-speed communication.

One of the key advantages of digital communication is the ability to implement error detection and correction techniques, such as parity checking and forward error correction. These techniques help in identifying and correcting errors introduced during transmission, thereby improving data integrity. Digital systems also allow easy encryption, compression, and storage of data, enhancing security and bandwidth utilization.

Digital communication is widely used in modern applications such as mobile communication, internet data transfer, satellite communication, optical fiber systems, and computer networks. Technologies like 4G, 5G, Wi-Fi, Bluetooth, and GPS are based on digital communication principles. Optical fiber communication, in particular, offers extremely high data rates and low signal loss, making it essential for backbone networks and high-speed internet services.

Despite the dominance of digital systems, analog communication still finds applications in specific areas due to its simplicity and low cost. Certain audio and radio broadcasting systems continue to use analog techniques, especially where infrastructure upgrades are limited.

In conclusion, both analog and digital communication systems have their own working principles and applications. While analog systems are suitable for basic and low-cost communication, digital communication dominates modern technologies due to its efficiency, reliability, scalability, and ability to support high data rates and advanced services.

Introduction to Microprocessors and Microcontrollers in Embedded Systems

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II ECE B

Microprocessors and microcontrollers are the core components of embedded systems, which are specialized computing systems designed to perform specific tasks within larger electronic devices. These components play a crucial role in modern electronics, enabling automation, control, and intelligent decision-making in various applications. They interact with sensors, actuators, and communication interfaces to ensure reliable operation, real-time processing, and efficient system performance across industrial, consumer, and automotive domains.

A microprocessor is a central processing unit (CPU) that performs arithmetic and logical operations but requires external components such as memory, input/output devices, and peripherals to function. Microprocessors are commonly used in systems where high processing power and flexibility are required, such as personal computers, laptops, and advanced industrial applications. They are suitable for complex computations, multitasking environments, and operating systems that require high-speed data processing and large memory support.

In contrast, a microcontroller integrates the CPU, memory (RAM, ROM/Flash), and input/output peripherals on a single chip. This high level of integration makes microcontrollers cost-effective, compact, and energy-efficient. They are widely used in embedded systems that require real-time control, such as washing machines, microwave ovens, automobiles, medical devices, and smart home systems. Microcontrollers are designed to perform dedicated tasks continuously with high reliability.

Embedded systems use microprocessors or microcontrollers to monitor inputs, process data, and control outputs based on programmed instructions. Sensors collect real-world data, actuators perform physical actions, and communication interfaces enable interaction with other systems. Microcontrollers are especially preferred in embedded systems due to their low power consumption, real-time response, and suitability for battery-operated devices.

From an ECE perspective, understanding microprocessors and microcontrollers is essential for designing efficient embedded applications. Programming languages such as C and assembly language are commonly used to develop firmware for these devices. With advancements in technology, modern microcontrollers support communication protocols like UART, SPI, I2C, CAN, and Ethernet, enabling seamless connectivity between devices and networks.

Recent developments have led to the emergence of 32-bit microcontrollers, ARM-based processors, and System-on-Chip (SoC) architectures, which offer higher performance and enhanced features. These devices are widely used in IoT applications, robotics, automation, and smart infrastructure. Power management, security, and real-time operating systems (RTOS) have also become important aspects of embedded system design.

In conclusion, microprocessors and microcontrollers form the foundation of embedded systems. Their widespread use in everyday electronic devices highlights their importance in modern technology and makes them a key area of study in Electronics and Communication Engineering. Mastery of these concepts opens doors to careers in embedded systems, IoT, automation, and core electronics industries.

Role of Electronics and Communication Engineering in Modern Technology

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Electronics and Communication Engineering (ECE) plays a vital role in shaping modern technology and improving the quality of human life. It forms the backbone of many advanced systems used in communication, computing, healthcare, transportation, and automation. ECE combines principles of electronics, signal processing, and communication to design efficient and intelligent technological solutions, supporting innovation, connectivity, reliability, and continuous technological advancement across various industries.

One of the major contributions of Electronics and Communication Engineering (ECE) is in the field of communication systems. Technologies such as mobile communication, satellite communication, optical fiber networks, and the internet rely heavily on ECE concepts. The evolution from 4G to 5G and the development of future wireless technologies have enabled high-speed data transfer, real-time communication, and global connectivity. These advancements support applications such as video conferencing, online education, digital payments, cloud computing, and smart communication networks, making information exchange faster and more reliable.

ECE also plays a significant role in consumer electronics. Devices such as smartphones, televisions, laptops, and wearable gadgets are designed using electronic circuits, embedded systems, and communication interfaces. Continuous innovation in ECE has led to compact designs, higher processing speeds, improved battery life, and enhanced user experience. In addition, ECE is essential in the development of embedded systems used in household appliances like washing machines, microwave ovens, air conditioners, automobiles, and industrial machines. These systems improve automation, safety, and energy efficiency in everyday applications.

In the healthcare sector, ECE contributes to medical electronics such as diagnostic equipment, patient monitoring systems, medical imaging devices, and wearable health sensors. Technologies like ECG, MRI, CT scans, and remote patient monitoring systems rely on electronic circuits, signal processing, and communication networks. These advancements help in early diagnosis, continuous monitoring of patients, and improved healthcare delivery, especially in remote and rural areas.

Similarly, in automation and robotics, ECE enables control systems, sensors, actuators, and communication networks that support smart manufacturing and Industry 4.0. Robotics, automated assembly lines, and intelligent control systems increase productivity, reduce human effort, and enhance precision in industrial operations.

Emerging technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Machine Learning (ML), and VLSI design are also closely associated with ECE. IoT enables interconnected smart devices, AI and ML bring intelligence and decision-making capabilities, while VLSI allows the design of high-performance and low-power integrated circuits. These technologies are driving innovations in smart cities, autonomous vehicles, renewable energy systems, and advanced communication networks.

In conclusion, Electronics and Communication Engineering is a key driver of modern technological advancement. Its wide range of applications, from communication and healthcare to automation and smart systems, makes ECE a crucial field in building a smarter, more connected, and technology-driven world.

Basics of Semiconductors and Their Applications in Daily Life

S Tejasvi
I ECE B

Semiconductors are materials whose electrical conductivity lies between that of conductors and insulators. Common semiconductor materials include silicon (Si) and germanium (Ge), which are widely used in electronic devices. The unique property of semiconductors is that their conductivity can be controlled by adding small amounts of impurities, a process known as doping. Based on doping, semiconductors are classified as intrinsic, n-type, and p-type, making them suitable for a wide range of electronic and communication applications.

In an intrinsic semiconductor, pure silicon or germanium is used, and electrical conduction occurs due to thermally generated charge carriers. When impurities are added, the material becomes an extrinsic semiconductor. Doping with pentavalent elements such as phosphorus produces n-type semiconductors, where electrons are the majority charge carriers. Doping with trivalent elements like boron results in p-type semiconductors, where holes are the majority carriers.

The most important semiconductor device is the p–n junction, formed by joining p-type and n-type materials. The p–n junction is the basic building block of many electronic components such as diodes, transistors, and integrated circuits. A diode allows current to flow in only one direction and is commonly used in rectifiers and voltage regulation circuits. Transistors, including bipolar junction transistors (BJTs) and field-effect transistors (FETs), act as switches or amplifiers and are essential components in modern electronics.

Semiconductors play a vital role in daily life applications. They are used in smartphones, computers, televisions, and household appliances such as washing machines and refrigerators. In communication systems, semiconductors enable signal processing, modulation, amplification, and data transmission. They are also widely used in LED lighting, solar cells, and power electronics, contributing to energy efficiency and renewable energy solutions.

In addition to consumer electronics, semiconductors are extensively used in automotive and medical applications. Modern vehicles rely on semiconductor devices for engine control units, airbags, navigation systems, and electric vehicle power management. In healthcare, semiconductor-based sensors and devices are used in medical imaging, patient monitoring systems, and diagnostic equipment, improving accuracy and reliability.

Semiconductors also play an important role in industrial automation and control systems. They are used in programmable logic controllers (PLCs), robotics, and industrial sensors to ensure precise control and monitoring. With advancements in technology, semiconductors are enabling emerging fields such as Internet of Things (IoT), artificial intelligence, and smart grids, where interconnected devices operate intelligently and efficiently.

In conclusion, semiconductors form the foundation of modern electronics. Their unique ability to control electrical properties makes them indispensable in designing efficient, compact, and intelligent electronic systems. As technology continues to advance, semiconductors will remain a key driving force behind innovation and development in everyday life and future technologies.

Placements

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