# 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. Phone: 08922-248001**

**www.raghuenggcollege.com**

## 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 ELECTRICAL AND ELECTRONICS ENGINEERING

## VISION

"To produce Electrical and Electronics Engineers through quality education with exposure to state of art technology and innovation with ethical values"

## MISSION

- M1 : Empowering students and professionals with state-of-art knowledge and Technological skills.
- M2 : To prepare students for higher studies and entrepreneurship.
- M3 : To impart essential skills of leadership, teamwork, communication and ethics among the students.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- **PEO 1:**
  **Domain Knowledge:**
  Graduates will have knowledge in basic science, mathematical tools and fundamental engineering stream with contemporary problem solving, critical analysis in Electrical and Electronics Engineering and its allied areas.

- **PEO 2:**
  **Communication Skills & Employability:**
  Graduates will have careers in the diversified sectors of electrical power industry, software industries and also encouraged for higher education and research.

- **PEO 3:**
  **Life Long Learning & Social Concern:**
  Graduates will be able to communicate effectively, adopt lifelong learning act with integrity and have inter personal skills needed to engage in, lead and nurture diverse teams with commitment to their ethical and social responsibilities.

## MAPPING OF MISSION STATEMENTS WITH PEOs

| MS/PEO | PEO 1 | PEO 2 | PEO 3 |
|---|---|---|---|
| **M1** | 3 | 3 | 2 |
| **M2** | 2 | 2 | 3 |
| **M3** | 2 | 3 | 2 |

**1**-Slight, **2**- Moderate, **3**- Substantial

## PROGRAMME OUTCOMES

Graduates of Electrical and Electronics Engineering Will:

| | |
|---|---|
| **PO 1** | **Engineering knowledge :**<br>Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. |
| **PO 2** | **Problem analysis:**<br>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:**<br>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:**<br>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**:<br>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. |

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| **PO 6** | **The engineer and society:**<br>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:**<br>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:**<br>Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. |
| **PO 9** | **Individual and team work:**<br>Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. |
| **PO 10** | **Communication:**<br>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:**<br>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**:<br>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. |

## PROGRAMME SPECIFIC OUTCOMES (PSOs)

**PSO 1:** On successful completion of the B. Tech. (EEE) Program, the graduates will be able to apply technical knowledge and usage of modern hardware & software tools related to Electrical and Electronics Engineering for solving real world problems.

**PSO 2:** On successful completion of the B. Tech. (EEE) Program, the graduates will be able to analyse, comprehend, design & develop Electrical subsystems/systems for a variety of engineering applications and thus demonstrating professional ethics and concern for societal wellbeing.

## MAPPING OF PEOS WITH POS AND PSOS:

| PEO/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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PEO 1** | 3 | 3 | 3 | 3 | | | | | | | | | 3 | 3 |
| **PEO 2** | | | | | | 3 | 3 | 3 | 3 | 3 | 3 | | 2 | 2 |
| **PEO 3** | | | | | | | | | 3 | 3 | | 3 | 2 | 2 |

**1-**Slight**, 2-** Moderate**, 3-** Substantial

## 2302102 - ELECTRICAL CIRCUIT ANALYSIS – II

**( Only for EEE )**

| Programme &Branch | B.Tech & EEE | Sem | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|---|
| **Prerequisites** | **23ES104** Basic Electrical and Electronics Engineering<br><br>**2302101** Electrical Circuit Analysis-I | **3** | **PC** | **3** | **0** | **0** | **3** |

**Course Objectives**:

- To understand three phase circuits
- To analyze transients in electrical systems
- To evaluate network parameters of given electrical network
- To analyze Fourier analysis and network synthesis.
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| **Preamble:** | This course aims at study of three phase systems, transient analysis, network synthesis and Fourier analysis and filters for the future study and analysis of power systems. |

**Course Contents:**

| Unit-1 | Analysis of three phase balanced circuits& unbalanced circuits | Contact Hours: 9 |
|---|---|---|

Phase sequence, star and delta connection of sources and loads, relationship between line and phase quantities, analysis of balanced three phase circuits, measurement of active and reactive power.
Loop method, Star-Delta transformation technique, measurement of active and reactive power.

| Unit-2 | Laplace transforms & Transient Analysis | Contact Hours:9 |
|---|---|---|

Definition and Laplace transforms of standard functions (Impulse, Step, Ramp, Parabolic) – Shifting theorem – Laplace Transforms of derivatives and integrals, Inverse Laplace transforms.
Transient response of R-L, R-C and R-L-C circuits for D.C. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transform approach.

| Unit-3 | Network Parameters | Contact Hours:9 |
|---|---|---|

Impedance parameters, Admittance parameters, Hybrid parameters, Transmission (ABCD) parameters, conversion of Parameters from one form to other, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations- problems.

| Unit-4 | Fourier Analysis | Contact Hours:9 |
|---|---|---|

Trigonometric and exponential form of Fourier series, evaluation of Fourier coefficients, Symmetry in Fourier Series – Even Symmetry, Odd Symmetry, Half Wave Symmetry, Quarter Wave Symmetry, Average & RMS values of periodic waveforms, Analysis of Electric Circuits with Periodic Excitation.

| Unit-5 | Network Synthesis | Contact Hours: 9 |
|---|---|---|

Driving point impedance and admittance, transfer impedance and admittance network function of Ladder and non ladder networks, poles , zeros analysis of network functions, Hurwitz polynomials, Positive Real Functions synthesis of LC, RC and Function by foster and causer methods.

**Total Hours: 45**

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| **Text Books:** | |
| 1 | Networks and Synthesis – D. Roy Choudhury, Third Edition, 2023, New Age International Publishers. |
| 2 | Engineering Circuit Analysis, William Hayt and Jack E. Kemmerly, 9th Edition McGraw-Hill, 2020 |
| **Reference Books:** | |
| 1 | Circuits and Networks Analysis and Synthesis, A. Sudhakar, Shyam Mohan S. Palli, 5th Edition, Tata McGraw-Hill, 2017. |
| 2 | Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, 7th Revised Edition. |
| **Web References :** | |
| 1 | https://archive.nptel.ac.in/courses/117/106/117106108/ |
| 2 | https://archive.nptel.ac.in/courses/108/105/108105159/ |

| **Course Outcomes:** Upon completion of the course, students shall have ability to | | **BT Mapped** (Highest Level) |
|---|---|---|
| **CO1** | Analyze the balanced and unbalanced 3 phase circuits for power calculations. | L3 |
| **CO2** | Analyze the transient behavior of electrical networks in different domains. | L3 |
| **CO3** | Estimate various Network parameters. | L2 |
| **CO4** | Apply the concept of Fourier series to electrical systems. | L3 |
| **CO5** | Analyze network Synthesis concepts. | 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 | 3 | 3 | | | | | | | | | | | 2 | 1 |
| CO 2 | 3 | 3 | | | | | | | | | | | 2 | 1 |
| CO 3 | 3 | 3 | | | | | | | | | | | 2 | 1 |
| CO 4 | 3 | 3 | | | | | | | | | | | 2 | 1 |
| CO 5 | 3 | 3 | | | | | | | | | | | 2 | 1 |
| 1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy | | | | | | | | | | | | | | |

| **Assessment Pattern – Theory** | | | | | | | |
|---|---|---|---|---|---|---|---|
| TEST | Remembering (K1)% | Understanding (K2)% | Applying (K3)% | Analyzing (K4)% | Evaluating (K5)% | Creating (K6)% | Total% |
| Mid-1 | 6 | 9 | 85 | | | | 100 |
| Mid-2 | 6 | 9 | 85 | | | | 100 |
| SEE | 10 | 10 | 80 | | | | 100 |