# RAGHU ENGINEERING COLLEGE

**AUTONOMOUS**

**(Approved by AICTE, New Delhi, & Permanently Affiliated to JNTU-GV, Vizianagaram)**

**NBA & NAAC A+ grade Accredited institute**

Dakamarri, Bheemili Mandal, Visakhapatnam Dist. – 531 162 (A.P.)

Phone: +91-8922-248001, 248002, 9963981111, 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 Civil Engineering

### VISION

To become a pioneer in the field of civil engineering by providing high quality education and research to serve the public consistently with competitive spirit professional ethics.

### MISSION

- M1: Provide quality knowledge and advance skills to the students in order to expertise theoretically and practically in the areas of civil engineering.
- M2: Improve the professional potentiality of the students and staff through educational programs to expand the knowledge in the field of civil engineering
- M3: Inculcate healthy competitive spirit towards the higher education and successful career in the field of civil engineering to serve the nation ethically.

### PROGRAMME EDUCTIONAL OBJECTIVES(PEOs)

- PEO 1: Employ a practicing civil engineer in construction, design, testing, and allied fields.
- PEO 2: Engaging in self-directed learning research or undertaking higher studies in the rapidly changing civil engineering environment.
- PEO 3: Create new methods/processes to meet the needs of society with their civil engineering knowledge.

**MAPPING OF MISSION STATEMENTS WITH PEOs**

| MS/PEO | PEO 1 | PEO 2 | PEO 3 |
|---|---|---|---|
| MS 1 | 3 | 3 | 2 |
| MS 2 | 3 | 3 | 2 |
| MS 3 | 3 | 3 | 2 |

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

| **PROGRAM OUTCOMES** | |
|---|---|
| **Graduates of Civil 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:** Analyze, design and execute the civil engineering structures with good knowledge in engineering, mathematics & basic sciences. | |
| **PSO 2:** Follow the economic, environmental and safety factors involved in the construction industry. | |

**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 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| **PEO 2** | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | 3 | 3 | 3 | 3 | 3 | 2 |
| **PEO 3** | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 3 | 2 |

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

| 2301104 TRANSPORTATION ENGINEERING | | | | | | | |
|---|---|---|---|---|---|---|---|
| (Civil Engineering) | | | | | | | |
| Programme &Branch | B.Tech & CIVIL | Sem | Category | L | T | P | Credit |
| Prerequisites | Surveying | 3 | Professional Core | 3 | 0 | 0 | 3 |

Course Objectives:

1. To impart different concepts in the field of Highway Engineering.
2. To acquire design principles of Highway Geometrics and Pavements.
3. To learn various highway construction and maintenance procedures.

| Preamble : | This course aims to equip students with the fundamental principles and advanced knowledge necessary to address the challenges of modern transportation systems. From traffic flow theory and transportation planning to the design of transportation infrastructure and intelligent transportation systems, students will explore various aspects that contribute to the efficient movement of people and goods |
|---|---|

Course Contents:

| Unit-1 | Highway Planning and Alignment | Contact Hours: 9 |
|---|---|---|

Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans – First, second, third road development plans, Rural Road Development Plan–Vision 2025; Planning Surveys; Highway Alignment-Factors affecting Alignment-Engineering Surveys

| Unit-2 | Highway Geometric Design | Contact Hours: 9 |
|---|---|---|

Highway Geometric Design: Importance of Geometric Design-Design controls and Criteria-Highway Cross Section Elements-Sight Distance Elements-Stopping sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment-Design of Super elevation and Extra widening - Design of Transition Curves- Design of Vertical alignment-Gradients-Vertical curves.

| Unit-3 | Traffic Engineering | Contact Hours: 9 |
|---|---|---|

Traffic Engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies; Speed studies– spot speed and speed & delay studies; Parking Studies; Road Accidents-Causes and Preventive measures- Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways–Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections- At-Grade Intersections, Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals–Webster Method –IRC Method.

| Unit-4 | **Highway Materials** | Contact Hours: 9 |
|---|---|---|

Highway Materials: Sub grade soil: classification–Group Index– Sub grade soil strength–California Bearing Ratio–Modulus of Sub grade Reaction. Stone aggregates: Desirable properties–Tests for Road Aggregates–Bituminous Materials: Types–Desirable properties–Tests on Bitumen–Bituminous paving mixes: Requirements–Marshall Method of Mix Design.

| Unit-5 | **Highway Construction and Maintenance** | Contact Hours: 9 |
|---|---|---|

Highway Construction and Maintenance: Types of Highway Construction– Earth work; Construction of Earth Roads, Gravel Roads, Water Bound Macadam Roads, Bituminous Pavements

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|---|---|
| and Construction of Cement Concrete Pavements. Pavement Failures, Maintenance of Highways, pavement evaluation, strengthening of existing pavements | |
| Total Hours: 45 | |
| **Text Books**: | |
| 1 | Highway Engineering, Khanna S.K.,Justo C.E.Gand Veeraragavan A,NemChand Bros., Roorkee. |
| 2 | Traffic Engineering and Transportation Planning, Kadiyali L.R,Khanna Publishers, New Delhi. |
| **Reference Books**: | |
| 1 | Principles of Highway Engineering, Kadiyali L.R, Khanna Publishers, New Delhi |
| 2 | Principles of Transportation Engineering, Partha Chakraborty and Animesh Das, PHI Learning Private Limited, Delhi |
| 3 | Transportation Engineering and Planning, Papacostas C.S. and P.D. Prevedouros, Prentice Hall of India Pvt. Ltd; New Delhi. |
| **Web References** : | |
| 1 | https://www.youtube.com/watch?v=gLJutFmRC0s&list=PLm_MSClsnwm_9ORFHqXsYqd24wH0gP1hD |
| 2 | https://www.aec.edu.in/aec/Instruction_Material/TE_Lecture_Notes-Unit-1.pdf |

| COURSE OUTCOMES:<br>Upon completion of the course, students shall have ability to | | BT Mapped<br>(Highest Level) |
|---|---|---|
| CO 1 | Plan highway network for a given area | 2 |
| CO 2 | Determine Highway alignment and design highway geometrics | 3 |
| CO 3 | Design Intersections and prepare traffic management plans | 4 |
| CO 4 | Judge suitability of pavement materials and design flexible and rigid pavements | 4 |
| CO 5 | Construct and maintain highways | 3 |

| 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 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 |
| CO 2 | 2 | 2 | 1 | 3 | 1 | 2 | 1 | 2 | 3 | 3 | 2 | 2 | 3 | 3 |
| CO 3 | 3 | 2 | 1 | 3 | 1 | 2 | 1 | 2 | 3 | 3 | 2 | 2 | 3 | 3 |
| CO 4 | 3 | 2 | 1 | 3 | 1 | 3 | 1 | 2 | 3 | 3 | 2 | 2 | 3 | 3 |
| CO 5 | 3 | 2 | 2 | 3 | 3 | 3 | | 2 | 3 | 3 | 2 | 2 | 3 | 3 |
| 1 – Slight, 2 – Moderate, 3 – Substantial | | | | | | | | | | | | | | |

| ASSESSMENT PATERN - THEORY | | | | | | | |
|---|---|---|---|---|---|---|---|
| TEST | Remembering (K2)% | Understanding (K2)% | Applying (K2)% | Analyzing (K2)% | Evaluating (K2)% | Creating (K2)% | Total% |
| MID-1 | 6 | 9 | 85 | - | - | - | 100 |
| MID-2 | 6 | 9 | 80 | 5 | - | - | 100 |
| SEE | 10 | 10 | 80 | - | - | - | 100 |
| *± 3% may be varied | | | | | | | |