# Indra Ganesan
## COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'B+' Grade, 2(f) & 12B Status Institution by UGC
IG Valley, Madurai Main Road, Manikandam, Tiruchirappalli - 620012

# NAAC DOCUMENTS

## QUALITY INDICATOR FRAME WORK

## CRITERION – 2

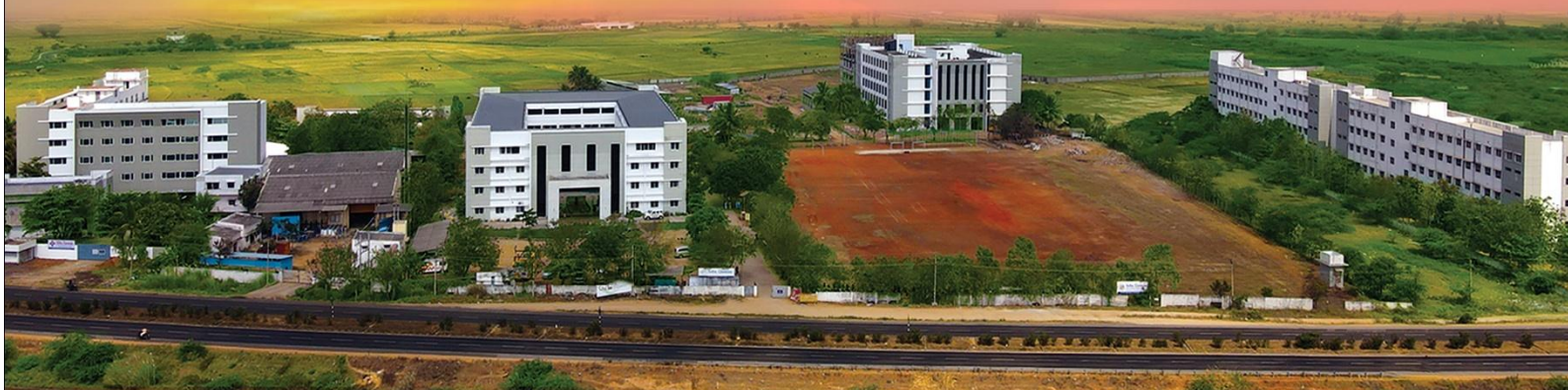
# TEACHING-LEARNING AND EVALUATION

SUBMITTED BY

IQAC

INTERNAL QUALITY ASSURANCE CELL

INDRA GANESAN COLLEGE OF ENGINEERING



| Criteria 2 | Teaching-Learning and Evaluation | 350 |
|---|---|---|

## Key Indicator-2.6 Student Performances and Learning Outcome (90)

**2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all programmes offered by the institution are stated and displayed on website**

# DEPARTMENT OF CIVIL ENGINEERING -R2013

**INDRA GANESAN COLLEGE OF ENGINEERING**
**IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India**
**(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)**

**DEPARTMENT OF CIVIL ENGINEERING**

## REGULATION -2013

## COURSE OUTCOMES

### C301- CE6501 STRUCTURAL ANALYSIS-I

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C301.1 | Analyse indeterminate trusses and frames by energy and consistent deformation method. | 1,2,3,4,10,11,12 | 1,2 |
| C301.2 | Analyse the determinate and indeterminate structures for moving load. | 1,2,3,4,10,11,12 | 1,2 |
| C301.3 | Discuss the different types of arches. | 1,2,3,4,10,11,12 | 1,2 |
| C301.4 | Conversant with slope deflection method. | 1,2,3,4,10,11,12 | 1,2 |
| C301.5 | Conversant with moment distribution method | 1,2,3,4,10,11,12 | 1,2 |
| C301.6 | Explain about conversant with classical methods of analysis. | 1,2,3,4,10,11,12 | 1,2 |

**Mapping of COs, C, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C301.1 | 3 | 3 | 2 | 2 | - | - | - | - | - | 3 | 1 | 1 | 2 | 2 |
| C301.2 | 3 | 3 | 2 | 2 | - | - | - | - | - | 3 | 1 | 1 | 2 | 2 |
| C301.3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 3 | 1 | 1 | 2 | 2 |
| C301.4 | 3 | 3 | 2 | 2 | - | - | - | - | - | 3 | 1 | 1 | 2 | 2 |
| C301.5 | 3 | 3 | 2 | 2 | - | - | - | - | - | 3 | 1 | 1 | 2 | 2 |
| C301.6 | 3 | 3 | 2 | 2 | - | - | - | - | - | 3 | 1 | 1 | 2 | 2 |
| C301 | 3 | 3 | 2 | 2 | - | - | - | - | - | 3 | 1 | 1 | 2 | 2 |

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## C302-CE6502 FOUNDATION ENGINEERING

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C302.1 | Explain the basic concept of site investigation and selection of foundation. | 1,2,3.4,7,9,10,11,12 | 1,2 |
| C302.2 | Discuss about types and purposes of different foundation systems and structures. | 1,2,3.4,7,9,10,11,12 | 1,2 |
| C302.3 | Elaborate the necessary theoretical background for design and construction of foundation systems. | 1,2,3.4,7,9,10,11,12 | 1,2 |
| C302.4 | Select type of foundation required for the soil at a place. | 1,2,3.4,7,9,10,11,12 | 1,2 |
| C302.5 | Design shallow foundation, deep foundation and retaining structures | 1,2,3.4,6,8,9,10,11,12 | 1,2 |
| C302.6 | Explain about the basic concepts of retaining wall construction. | 1,2,3.4,6,8,7,9,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C302.1 | 3 | 3 | 2 | 2 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C302.2 | 3 | 3 | 2 | 2 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C302.3 | 3 | 3 | 2 | 2 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C302.4 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C302.5 | 3 | 3 | 2 | 2 | - | 3 | - | 2 | 2 | 3 | 1 | 1 | 3 | 2 |
| C302.6 | 3 | 3 | 2 | 2 | - | 3 | - | 2 | 2 | 3 | 1 | 1 | 3 | 2 |
| C302 | 3 | 3 | 2 | 2 | - | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 3 | 2 |

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## C303- CE6503 ENVIRONMENTAL ENGINEERING-I

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C303.1 | Explain the basic concepts of water supply system and water quality characteristics. | 1,2,3,4,6,7,10,11,12 | 1,2 |
| C303.2 | Compute hydraulics of flow in pressure pipes as gravity mains. | 1,2,3,4,6,7,10,11,12 | 1,2 |
| C303.3 | Plan for the primary water treatment units. | 1,2,3,4,6,7,10,11,12 | 1,2 |
| C303.4 | Summarize the concepts and terminologies of advanced water treatment units | 1,2,3,4,6,7,10,11,12 | 1,2 |
| C303.5 | Analyse the water distribution networks. | 1,2,3,4,6,7,10,11,12 | 1,2 |
| C303.6 | Discuss usages of natural resource and its quality. | 1,2,3,4,6,7,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C303.1 | 3 | 2 | 1 | 1 | - | 3 | 2 | - | - | 3 | 1 | 1 | 2 | 2 |
| C303.2 | 3 | 2 | 1 | 1 | - | 3 | 2 | - | - | 3 | 1 | 1 | 2 | 2 |
| C303.3 | 3 | 2 | 1 | 1 | - | 3 | 2 | - | - | 3 | 1 | 1 | 2 | 2 |
| C303.4 | 3 | 2 | 1 | 1 | - | 3 | 2 | - | - | 3 | 1 | 1 | 2 | 2 |
| C303.5 | 3 | 2 | 1 | 1 | - | 3 | 2 | - | - | 3 | 1 | 1 | 2 | 2 |
| C303.6 | 3 | 2 | 1 | 1 | - | 3 | 2 | - | - | 3 | 1 | 1 | 2 | 2 |
| C303. | 3 | 2 | 1 | 1 | - | 3 | 2 | - | - | 3 | 1 | 1 | 2 | 2 |

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## C304- CE6504 HIGHWAY ENGINEERING

After the course, the student should be able to:

| CO | COURSE OUTCOMES | POS | PSOS |
|---|---|---|---|
| C304.1 | Explain the highway planning with respect to classification and know about the factors influencing highway alignment. | 1,2,3,4,10,11,12 | 1,2 |
| C304.2 | Interpret the geometric design fundamentals of highway and focusing on horizontal and vertical curves. | 1,2,3,4,10,11,12 | 1,2 |
| C304.3 | Develop the road pavement design and analysis of flexible and rigid pavement. | 1,2,3,4,10,11,12 | 1,2 |
| C304.4 | Identify the different materials to be used in different layers of road and suitable construction machineries. | 1,2,3,4,10,11,12 | 1,2 |
| C304.5 | Explain the possible causes of defects and appropriate road monitoring and maintenance program | 1,2,3,4,10,11,12 | 1,2 |
| C304.6 | Explain about evaluation and maintenance of pavements | 1,2,3,4,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| COURSE | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C304.1 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C304.2 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C304.3 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C304.4 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C304.5 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C304.6 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C304 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 1 | 1 | 3 | 2 |

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## C305-CE6505& DESIGN OF REINFORCED CONCRETE ELEMENTS

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C305.1 | Explain the concept of elastic, ultimate load and limit state methods. | 1,2,3,4,5,10,11,12 | 1,2 |
| C305.2 | Design of Reinforced concrete beams and slabs subjected to various boundary conditions. | 1,2,3,4,5,10,11,12 | 1,2 |
| C305.3 | Analyze the behaviour of RC members subjected to shear and torsion. | 1,2,3,4,5,10,11,12 | 1,2 |
| C305.4 | Design short circular and rectangular columns for axial, uniaxial and biaxial bending. | 1,2,3,4,5,10,11,12 | 1,2 |
| C305.5 | Design axially and eccentrically loaded rectangular footing | 1,2,3,4,5,10,11,12 | 1,2 |
| C305.6 | Discuss about the design of all structural members | 1,2,3,4,5,10,11,12 | 1,2 |

**Mapping of COs, C, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C305.1 | 3 | 2 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 2 | 3 | 2 |
| C305.2 | 3 | 2 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 2 | 3 | 2 |
| C305.3 | 3 | 2 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 2 | 3 | 2 |
| C305.4 | 3 | 2 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 2 | 3 | 2 |
| C305.5 | 3 | 2 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 2 | 3 | 2 |
| C305.6 | 3 | 2 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 2 | 3 | 2 |
| C305 | 3 | 2 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 2 | 3 | 2 |

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## C306- CE6506 CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICE

After the course, the student should be able to:

| CO | COURSE OUTCOMES | POs | PSOs |
|---|---|---|---|
| C306.1 | Apply the theoretical concepts of concrete technology in the real world construction techniques. | 1,2,3,4,5,7,9,10,11,12 | 1,2 |
| C306.2 | Summarize the construction practices starting from sub structure to super structure using different materials and innovative techniques | 1,2,3,4,5,7,9,10,11,12 | 1,2 |
| C306.3 | Explain the construction knowledge of sub structure element using techniques such as tunneling, piling, shoring for deep cutting and dewatering | 1,2,3,4,5.7,9,10,11,12 | 1,2 |
| C306.4 | Discuss the different construction techniques for super structure construction | 1,2,3,4,5.7,9,10,11,12 | 1,2 |
| C306.5 | Identify and select the construction equipment for earth work. | 1,2,3,4,5.7,9,10,11,12 | 1,2 |
| C306.6 | Explain about the construction equipment in real time practice. | 1,2,3,4,5.7,9,10,11,12 | 1,2 |

**Mapping of COs, C, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C306.1 | 3 | 2 | 1 | 1 | 1 | - | 2 | - | 1 | 3 | 1 | 1 | 2 | 2 |
| C306.2 | 3 | 2 | 1 | 1 | 1 | - | 2 | - | 1 | 3 | 1 | 1 | 2 | 2 |
| C306.3 | 3 | 2 | 1 | 1 | 1 | - | 2 | - | 1 | 3 | 1 | 1 | 2 | 2 |
| C306.4 | 3 | 2 | 1 | 1 | 1 | - | 2 | - | 1 | 3 | 1 | 1 | 2 | 2 |
| C306.5 | 3 | 2 | 1 | 1 | 1 | - | 2 | - | 1 | 3 | 1 | 1 | 2 | 2 |
| C306.5 | 3 | 2 | 1 | 1 | 1 | - | 2 | - | 1 | 3 | 1 | 1 | 2 | 2 |
| C306 | 3 | 2 | 1 | 1 | 1 | - | 2 | - | 1 | 3 | 1 | 1 | 2 | 2 |

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## C307 :GE6563 COMMUNICATION SKILLS – LABORATORY

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C307.1 | Listen and interpret visuals, involve in formal and informal conversations, make presentations, and participate in GD. | 1,2,3,4,8,9,10,11,12 | 1,2 |
| C307.2 | Explain Suitable audio/video samples from Podcast/YouTube to be used for illustrative purposes | 1,2,3,4,8,9,10,11,12 | 1,2 |
| C307.3 | Discuss about IELTS, TOEFL, GRE, and placement oriented verbal ability. | 1,2,3,4,8,9,10,11,12 | 1,2 |
| C307.4 | Explain GD/Interview/Role Play/Debate could be conducted off the laboratory but learners are to be exposed to telephonic interview and video conferencing. | 1,2,3,4,8,9,10,11,12 | 1,2 |
| C307.5 | Explain Learners are to be assigned to read/write/listen/view materials outside the classroom as well for graining proficiency and better participation in the class. | 1,2,3,4,8,9,10,11,12 | 1,2 |
| C307.6 | Illustrate about the professional ethics and communication skills. | 1,2,3,4,8,9,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C307.1** | 2 | 2 | 1 | 1 | - | - | - | 1 | 2 | 3 | 2 | 2 | 3 | 2 |
| **C307.2** | 2 | 2 | 1 | 1 | - | - | - | 1 | 2 | 3 | 2 | 2 | 3 | 2 |
| **C307.3** | 2 | 2 | 1 | 1 | - | - | - | 1 | 2 | 3 | 2 | 2 | 3 | 2 |
| **C307.4** | 2 | 2 | 1 | 1 | - | - | - | 1 | 2 | 3 | 2 | 2 | 3 | 2 |
| **C307.5** | 2 | 2 | 1 | 1 | - | - | - | 1 | 2 | 3 | 2 | 2 | 3 | 2 |
| **C307.6** | 2 | 2 | 1 | 1 | - | - | - | 1 | 2 | 3 | 2 | 2 | 3 | 2 |
| **C307** | 2 | 2 | 1 | 1 | - | - | - | 1 | 2 | 3 | 2 | 2 | 3 | 2 |

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## C 308: CE6511 SOIL MECHANICS LABORATORY

After the course, the student should be able to:

| CO | COURSE OUTCOMES | POs | PSOs |
|---|---|---|---|
| C308.1 | Explain about the basic concept and techniques. | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |
| C308.2 | Explain about the index properties of soil. | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |
| C308.3 | Conduct tests to determine Engineering properties of soil. | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |
| C308.4 | Demonstrate the shear strength. | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |
| C308.5 | Discuss about the compressibility. | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |
| C308.6 | Explain about the permeability by conducting appropriate tests. | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |

**Mapping of COs, C, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C308.1 | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 3 | 2 | 1 | 2 | 2 | 2 |
| C308.2 | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 3 | 2 | 1 | 2 | 2 | 2 |
| C308.3 | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 3 | 2 | 1 | 2 | 2 | 2 |
| C308.4 | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 3 | 2 | 1 | 2 | 2 | 2 |
| C308.5 | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 3 | 2 | 1 | 2 | 2 | 2 |
| C308.6 | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 3 | 2 | 1 | 2 | 2 | 2 |
| C308 | 3 | 2 | 2 | 2 | 3 | 3 | - | 2 | 3 | 2 | 1 | 2 | 2 | 2 |

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## C309- CE6512 SURVEY CAMP

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C309.1 | Explain about the Triangulation. | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |
| C309.2 | Explain about the Trilateration. | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |
| C309.3 | Explain about the Rectangulation | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |
| C309.4 | Demonstrate and handle survey instruments like theodolite. | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |
| C309.5 | Demonstrate about the tachometry and total station. | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |
| C309.6 | Discuss in general field marking for various engineering projects. | 1,2,3,4,5,6,8,9,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C309.1 | 3 | 1 | 1 | 1 | 2 | 2 | - | 3 | 3 | 2 | 1 | 1 | 2 | 2 |
| C309.2 | 3 | 1 | 1 | 1 | 2 | 2 | - | 3 | 3 | 2 | 1 | 1 | 2 | 2 |
| C309.3 | 3 | 1 | 1 | 1 | 2 | 2 | - | 3 | 3 | 2 | 1 | 1 | 2 | 2 |
| C309.4 | 3 | 1 | 1 | 1 | 2 | 2 | - | 3 | 3 | 2 | 1 | 1 | 2 | 2 |
| C309.5 | 3 | 1 | 1 | 1 | 2 | 2 | - | 3 | 3 | 2 | 1 | 1 | 2 | 2 |
| C309.6 | 3 | 1 | 1 | 1 | 2 | 2 | - | 3 | 3 | 2 | 1 | 1 | 2 | 2 |
| C309 | 3 | 1 | 1 | 1 | 2 | 2 | - | 3 | 3 | 2 | 1 | 1 | 2 | 2 |

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## SEMESTER VI

### C310 CE6601- Design of Reinforced Concrete & Brick Masonry Structures

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C310.1 | Design cantilever and counterfort retaining walls. | 1,2,3,4,9,10,11,12 | 1,2 |
| C310.2 | Design rectangular and circular water tanks above and below the ground level. | 1,2,3,4,9,10,11,12 | 1,2 |
| C310.3 | Design and draw the detailing of staircases & flat slabs and prepare bar bending schedule. | 1,2,3,4,9,10,11,12 | 1,2 |
| C310.4 | Apply the design principles of mat foundation, box culvert, and road bridges | 1,2,3,4,9,10,11,12 | 1,2 |
| C310.5 | Analyze and design the brick masonry walls and continuous beams subjected to various load conditions | 1,2,3,4,9,10,11,12 | 1,2 |
| C310.6 | Apply the concept of yield line theory for designing various types of slabs. | 1,2,3,4,9,10,11,12 | 1,2 |

**Mapping of COs, C, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C310.1 | 3 | 3 | 3 | 2 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C310.2 | 3 | 3 | 3 | 2 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C310.3 | 3 | 3 | 3 | 2 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C310.4 | 3 | 3 | 3 | 2 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C310.5 | 3 | 3 | 3 | 2 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C310.6 | 3 | 3 | 3 | 2 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C310 | 3 | 3 | 3 | 2 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |

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## C311: CE6602- Structural Analysis II

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C311.1 | Explain the different types of indeterminacy and the use of compatibility conditions in analyzing indeterminate structures. | 1,2,3,4,9,10,11,12 | 1,2 |
| C311.2 | Construct the element stiffness matrix and assemble the structure stiffness matrix for solving indeterminate problems | 1,2,3,4,9,10,11,12 | 1,2 |
| C311.3 | Able to apply the concept of finite element method to the structural analysis. | 1,2,3,4,9,10,11,12 | 1,2 |
| C311.4 | Calculate the collapse loads for beams and frames using plastic analysis. | 1,2,3,4,9,10,11,12 | 1,2 |
| C311.5 | Determine the member forces in suspension bridges and space truss. | 1,2,3,4,9,10,11,12 | 1,2 |
| C311.6 | Analyze continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by strain energy method. | 1,2,3,4,9,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C311.1 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C311.2 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C311.3 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C311.4 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C311.5 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C311.6 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C311 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |

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## C312:CE6603- Design of Steel Structures

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C312.1 | Explain the different failure modes of bolded connections for tension or compression members. | 1,2,3,4,10,11,12 | 1,2 |
| C312.2 | Design the tension members. | 1,2,3,4,10,11,12 | 1,2 |
| C312.3 | Analyze the most suitable section shape and size for a compression member as per provisions of current code (IS 800 – 2007). | 1,2,3,4,10,11,12 | 1,2 |
| C312.4 | Design the beams and plate girders. | 1,2,3,4,10,11,12 | 1,2 |
| C312.5 | Design the structural systems such as roof trusses, side coverings. | 1,2,3,4,10,11,12 | 1,2 |
| C312.6 | Derive the flexural member and design the gantry girders. | 1,2,3,4,10,11,12 | 1,2 |

**Mapping of COs, C, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C312.1 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C312.2 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C312.3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C312.4 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C312.5 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C312.6 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C312 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |

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## C313-CE6604- Railways, Airports and Harbour Engineering

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C313.1 | Discuss the fundamental concepts of railway planning and describe the engineering survey for track alignment. | 1,2,3,4,9,10,11,12 | 1,2,3 |
| C313.2 | Explain the railway track construction, maintenance and able to find out the suitable method of tunneling. | 1,2,3,4,9,10,11,12 | 1,2,3 |
| C313.3 | Describe the criteria for airport site selection and airport layout. | 1,2,3,4,9,10,11,12 | 1,2,3 |
| C313.4 | Illustrate the basic runway length required for an airport and explain marking and lighting for runway and taxiway. | 1,2,3,4,9,10,11,12 | 1,2,3 |
| C313.5 | Classify the harbour and describe the harbour requirements and various coastal structures. | 1,2,3,4,9,10,11,12 | 1,2,3 |
| C313.6 | Explain about the coastal protection works and coastal Regulations to be adopted | 1,2,3,4,9,10,11,12 | 1,2,3 |

**Mapping of COs, C, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C312.1 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C312.2 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C312.3 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C312.4 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C312.5 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C312.6 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C312.1 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |

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## C314 CE6605- Environmental Engineering II

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C314.1 | Summarize the sewage characteristics and estimate sewage flow and runoff | 1,2,3,4,10,11,12 | 1,2 |
| C314.2 | Compute hydraulics of flow in sewers and identify suitable pumps and pipes. | 1,2,3,4,10,11,12 | 1,2 |
| C314.3 | Design and evaluate Plan for the primary sewage treatment units. | 1,2,3,4,10,11,12 | 1,2 |
| C314.4 | Design the biological treatment units for sewages. | 1,2,3,4,10,11,12 | 1,2 |
| C314.5 | Explain the sewage disposal methods and sludge management. | 1,2,3,4,10,11,12 | 1,2 |
| C314.6 | Design the unit operations and processes that are used in sewage treatment. | 1,2,3,4,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C314.1 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C314.2 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C314.3 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C314.4 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C314.5 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C314.6 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |
| C314 | 3 | 2 | 1 | 1 | - | - | - | - | - | 3 | 2 | 2 | 2 | 2 |

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## C315: GE6075 Professional Ethics

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C315.1 | Apply ethics, morals and human values in society. | 1,2,3,4,5,9,10,11,12 | 1,2 |
| C315.2 | Explain about engineering ethics | 1,2,3,4,5,9,10,11,12 | 1,2 |
| C315.3 | Realize the responsibilities of engineers as experimenters. | 1,2,3,4,5,9,10,11,12 | 1,2 |
| C315.4 | Recognize the safety, risks, risk benefit analysis and rights of an engineer | 1,2,3,4,5,9,10,11,12 | 1,2 |
| C315.5 | Discuss the importance of the global issues, moral leadership and code of conduct. | 1,2,3,4,5,9,10,11,12 | 1,2 |
| C315.6 | To know the Role of Non-Government Organizations in slum housing. | 1,2,3,4,5,9,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C315.1 | 3 | 2 | 2 | 1 | 2 | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C315.2 | 3 | 2 | 2 | 1 | 2 | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C315.3 | 3 | 2 | 2 | 1 | 2 | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C315.4 | 3 | 2 | 2 | 1 | 2 | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C315.5 | 3 | 2 | 2 | 1 | 2 | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C315.6 | 3 | 2 | 2 | 1 | 2 | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C315 | 3 | 2 | 2 | 1 | 2 | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |

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## C316:CE6611- ENVIRONMENTAL ENGINEERING LABORATORY

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C316.1 | Perform common environmental experiments relating to water and wastewater quality. | 1,2,3,4,5,6,7,9,10,11,12 | 1,2 |
| C316.2 | Characterize wastewater conduct treatability studies | 1,2,3,4,5,6,7,9,10,11,12 | 1,2 |
| C316.3 | Determine the amount of COD and COD present in the sample | 1,2,3,4,5,6,7,9,10,11,12 | 1,2 |
| C316.4 | Estimate the amount of pollutant present in the waste water. | 1,2,3,4,5,6,7,9,10,11,12 | 1,2 |
| C316.5 | Analyse the laboratory results to the problem identification | 1,2,3,4,5,6,7,9,10,11,12 | 1,2 |
| C316.6 | Determine the amount of Calcium, Potassium and Sodium | 1,2,3,4,5,6,7,9,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C316.1 | 2 | 1 | 1 | 1 | 3 | 2 | 2 | - | 3 | 3 | 1 | 1 | 2 | 2 |
| C316.2 | 2 | 1 | 1 | 1 | 3 | 2 | 2 | - | 3 | 3 | 1 | 1 | 2 | 2 |
| C316.3 | 2 | 1 | 1 | 1 | 3 | 2 | 2 | - | 3 | 3 | 1 | 1 | 2 | 2 |
| C316.4 | 2 | 1 | 1 | 1 | 3 | 2 | 2 | - | 3 | 3 | 1 | 1 | 2 | 2 |
| C316.5 | 2 | 1 | 1 | 1 | 3 | 2 | 2 | - | 3 | 3 | 1 | 1 | 2 | 2 |
| C316.6 | 2 | 1 | 1 | 1 | 3 | 2 | 2 | - | 3 | 3 | 1 | 1 | 2 | 2 |
| C316 | 2 | 1 | 1 | 1 | 3 | 2 | 2 | - | 3 | 3 | 1 | 1 | 2 | 2 |

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## C317 :CE6612- CONCRETE AND HIGHWAY ENGINEERING LABORATORY

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C317.1 | Explain the properties of concrete and testing procedures. | 1,2,3,4,5,6,8,9,11,12 | 1,2,3 |
| C317.2 | Measure the test values and compare the test results. | 1,2,3,4,5,6,8,9,11,12 | 1,2,3 |
| C317.3 | Ensure quality control while testing/sampling and acceptance criteria | 1,2,3,4,5,6,8,9,11,12 | 1,2,3 |
| C317.4 | Determine the properties of fresh and hardened concrete. | 1,2,3,4,5,6,7,8,9,11,12 | 1,2,3 |
| C317.5 | Practice the usage of bitumen as pavement material in the highway engineering field | 1,2,3,4,5,6,7,8,9,11,12 | 1,2,3 |
| C317.6 | Discuss the principles and procedures of testing on aggregate | 1,2,3,4,5,6,7,8,9,11,12 | 1,2,3 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C317.1 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C317.2 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C317.3 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C317.4 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C317.5 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C317.6 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |
| C317 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 2 | 2 | 2 |

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## Semester VII

### C401: CE6701 Structural Dynamics and Earthquake Engineering

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C401.1 | Explain the fundamental concepts of static and dynamics in structural response. | 1,2,3,4,7,10,11,12 | 1,2 |
| C401.2 | Evaluate the equations of motion of multi degree of freedom system | 1,2,3,4,7,10,11,12 | 1,2 |
| C401.3 | Illustrate the earthquake parameters, magnitude and intensity. | 1,2,3,4,7,10,11,12 | 1,2 |
| C401.4 | Analyse the effect on reinforced cement concrete, steel and pre-stressed concrete structure under earthquake load. | 1,2,3,4,7,10,11,12 | 1,2 |
| C401.5 | Design the structures for seismic loading as per code provisions IS: 13920-1993. | 1,2,3,4,7,10,11,12 | 1,2 |
| C401.6 | Explain about the seismic design methodology. | 1,2,3,4,7,10,11,12 | 1,2 |

**Mapping of COs, C, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C401.1 | 3 | 3 | 2 | 2 | - | - | 3 | - | - | 3 | 1 | 1 | 3 | 1 |
| C401.2 | 3 | 3 | 2 | 2 | - | - | 3 | - | - | 3 | 1 | 1 | 3 | 1 |
| C401.3 | 3 | 3 | 2 | 2 | - | - | 3 | - | - | 3 | 1 | 1 | 3 | 1 |
| C401.4 | 3 | 3 | 2 | 2 | - | - | 3 | - | - | 3 | 1 | 1 | 3 | 1 |
| C401.5 | 3 | 3 | 2 | 2 | - | - | 3 | - | - | 3 | 1 | 1 | 3 | 1 |
| C401.6 | 3 | 3 | 2 | 2 | - | - | 3 | - | - | 3 | 1 | 1 | 3 | 1 |
| C401 | 3 | 3 | 2 | 2 | - | - | 3 | - | - | 3 | 1 | 1 | 3 | 1 |

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## C402 CE6702 PRESTRESSED CONCRETE STRUCTURE

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C402.1 | Determine the suitable method of pre stressing according to the requirements and calculate the various losses of pre stress. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C402.2 | Design the Type I, Type II post-tensioned, pre tensioned beams and shear based on IS code | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C402.3 | Determine the anchorage zone stresses in posttensioned beams and design the anchorage zone reinforcement. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C402.4 | Calculate the resultant stresses developed in composite beams and to analyse for the secondary moments | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C402.5 | Design the various tension and compression members according to the requirements. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C402.6 | Explain about the composite beams and continuous beams. | 1,2,3,4,7,9,10,11,12 | 1,2 |

**Mapping of COs, C, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C402.1 | 3 | 2 | 1 | 1 | - | - | 3 | - | - | 3 | 3 | 3 | 3 | 2 |
| C402.2 | 3 | 2 | 1 | 1 | - | - | 3 | - | - | 3 | 3 | 3 | 3 | 2 |
| C402.3 | 3 | 2 | 1 | 1 | - | - | 3 | - | - | 3 | 3 | 3 | 3 | 2 |
| C402.4 | 3 | 2 | 1 | 1 | - | - | 3 | - | - | 3 | 3 | 3 | 3 | 2 |
| C402.5 | 3 | 2 | 1 | 1 | - | - | 3 | - | - | 3 | 3 | 3 | 3 | 2 |
| C402.6 | 3 | 2 | 1 | 1 | - | - | 3 | - | - | 3 | 3 | 3 | 3 | 2 |
| C402 | 3 | 2 | 1 | 1 | - | - | 3 | - | - | 3 | 3 | 3 | 3 | 2 |

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## C403:CE6703 WATER RESOURCES AND IRRIGATION ENGINEERING

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C403.1 | Estimate the reservoir capacity based on the water requirement for Irrigation and Drinking | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C403.2 | Identify the importance of National water policy and Economics of water resources planning. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C403.3 | Calculate the water requirements of crops based on crop's base period and delta | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C403.4 | Explain about the Irrigation structures such as Dams and diversion head works. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C403.5 | Discuss about the irrigation methods and management. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C403.6 | Explain about the dam management. | 1,2,3,4,7,9,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C403.1 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C403.2 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C403.3 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C403.4 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C403.5 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C403.6 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C403 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |

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## C404: CE6704 Estimation and Quantity Surveying

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C404.1 | Estimate the different item of work in residential building | 1,2,3,4,9,10,11,12 | 1,2 |
| C404.2 | Estimate the different type of structure such as culvert, road work, sanitary and water supply works. | 1,2,3,4,9,10,11,12 | 1,2 |
| C404.3 | Arrive the schedule of rates, tender, contract document. | 1,2,3,4,9,10,11,12 | 1,2 |
| C404.4 | Valuate the building with depreciation. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C404.5 | Prepare a report on estimate of residential building, culvert | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C404.6 | Explain about the estimate the material quantities, prepare a bill of quantities, student shall be able to prepare value estimates. | 1,2,3,4,7,9,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C404.1 | 3 | 3 | 2 | 1 | - | - | - | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C404.2 | 3 | 3 | 2 | 1 | - | - | - | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C404.3 | 3 | 3 | 2 | 1 | - | - | - | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C404.4 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C404.5 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C404.6 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C404 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |

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## C405: CE6006 Traffic Engineering and Management

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C405.1 | Describe the Characteristics of Vehicles, Road users and the fundamentals of traffic flow. | 1,2,3,4,9,10,11,12 | 1,2 |
| C405.2 | Examine about origin and destination, parking, accident studies and traffic forecasting. | 1,2,3,4,9,10,11,12 | 1,2 |
| C405.3 | Describe the design of Traffic signals, signal coordination, grade separation and traffic signs | 1,2,3,4,9,10,11,12 | 1,2 |
| C405.4 | Explain the road accidents, street lighting, traffic and environment hazards. | 1,2,3,4,9,10,11,12 | 1,2 |
| C405.5 | Describe the Traffic System Management | 1,2,3,4,9,10,11,12 | 1,2 |
| C405.6 | Explain about the Intelligent Transport System. | 1,2,3,4,9,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C405.1 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C405.2 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C405.3 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C405.4 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C405.5 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C405.6 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C405 | 3 | 3 | 2 | 2 | - | - | - | - | 2 | 3 | 1 | 1 | 3 | 2 |

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## C406: CE6011 Air Pollution Management

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C406.1 | Explain the nature and characteristics of air pollutants and basic concepts of air quality management. | 1,2,3,4,10,11,12 | 1,2 |
| C406.2 | Design stacks and particulate air pollution control devices to meet applicable standards | 1,2,3,4,10,11,12 | 1,2 |
| C406.3 | Explain the gaseous pollutant control by adsorption, absorption, condensation and combustion | 1,2,3,4,10,11,12 | 1,2 |
| C406.4 | Demonstrate the environmental impact assessment and air quality. | 1,2,3,4,10,11,12 | 1,2 |
| C406.5 | Identify and solve noise pollution problems. | 1,2,3,4,10,11,12 | 1,2 |
| C406.6 | Discuss about the air pollution causes to the human beings , animals and plants. | 1,2,3,4,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C406.1 | 3 | 3 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 3 | 2 |
| C406.2 | 3 | 3 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 3 | 2 |
| C406.3 | 3 | 3 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 3 | 2 |
| C406.4 | 3 | 3 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 3 | 2 |
| C406.5 | 3 | 3 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 3 | 2 |
| C406.6 | 3 | 3 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 3 | 2 |
| C406 | 3 | 3 | 2 | 1 | - | - | - | - | - | 3 | 2 | 2 | 3 | 2 |

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## C 407: CE6711 -COMPUTER AIDED DESIGN AND DRAFTING LABORATORY

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C407.1 | Design and drawing of RCC cantilever and counter fort type retaining walls with reinforcement details. | 1,2,3,4,5,10,11,12 | 1,2 |
| C407.2 | Design of solid slab and RCC Tee beam bridges for IRC loading and reinforcement details | 1,2,3,4,5,10,11,12 | 1,2 |
| C407.3 | Design and drafting of circular and rectangular RCC water tanks. | 1,2,3,4,5,10,11,12 | 1,2 |
| C407.4 | Design of plate Girder Bridge ,Truss Girder bridges and Detailed Drawings including connections | 1,2,3,4,5,10,11,12 | 1,2 |
| C407.5 | Design of hemispherical bottomed steel tank | 1,2,3,4,5,10,11,12 | 1,2 |
| C407.6 | Prepare the structural drawings for concrete and steel structures. | 1,2,3,4,5,10,11,12 | 1,2 |

**Mapping of COs, C, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C407.1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C407.2 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C407.3 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C407.4 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C407.5 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C407.6 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 1 | 3 | 2 |
| C407 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 3 | 1 | 1 | 3 | 2 |

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## C408:_ CE6712-DESIGN PROJECT

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C408.1 | Design engineering solutions to complex projects using fundamental knowledge, skills and attitudes of a professional engineer | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C408.2 | Identify project outcomes, constraints, deliverables, performance criteria, control needs, and resource requirements etc. | 1,2,4,7,9,10,11,12 | 1,2 |
| C408.3 | Analyze the structure related to Civil Engineering design problems | 1,2,4,7,9,10,11,12 | 1,2 |
| C408.4 | Discuss with team members in a professional and ethical manner, respecting differences, to ensure a collaborative project environment | 1,2,4,7,9,10,11,12 | 1,2 |
| C408.5 | Communicate effectively to present ideas clearly and coherently both in the written and oral forms | 1,2,4,7,9,10,11,12 | 1,2 |
| C408.6 | Explain about the basic concepts of construction. | 1,2,4,7,9,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C408.1 | 3 | 3 | 2 | 2 | 2 | - | 1 | 1 | 2 | 3 | 1 | 1 | 3 | 2 |
| C408.2 | 3 | 3 | 2 | 2 | 2 | - | 1 | 1 | 2 | 3 | 1 | 1 | 3 | 2 |
| C408.3 | 3 | 3 | 2 | 2 | 2 | - | 1 | 1 | 2 | 3 | 1 | 1 | 3 | 2 |
| C408.4 | 3 | 3 | 2 | 2 | 2 | - | 1 | 1 | 2 | 3 | 1 | 1 | 3 | 2 |
| C408.5 | 3 | 3 | 2 | 2 | 2 | - | 1 | 1 | 2 | 3 | 1 | 1 | 3 | 2 |
| C408.6 | 3 | 3 | 2 | 2 | 2 | - | 1 | 1 | 2 | 3 | 1 | 1 | 3 | 2 |
| C408 | 3 | 3 | 2 | 2 | 2 | - | 1 | 1 | 2 | 3 | 1 | 1 | 3 | 2 |

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## VIII SEMESTER

### C409: MG6851 Principles of Management

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C409.1 | Discuss the evolution of management, functions and roles of managers | 1,2,4,7,9,10,11,12 | 1,2 |
| C409.2 | Explain the different types of planning process and tools used for planning | 1,2,4,7,9,10,11,12 | 1,2 |
| C409.3 | Elaborate different organization structures and functions of human resources manager | 1,2,4,7,9,10,11,12 | 1,2 |
| C409.4 | Illustrate the different theories of motivation and leadership | 1,2,4,7,9,10,11,12 | 1,2 |
| C409.5 | Describe the control techniques and the role of technology in management | 1,2,4,7,9,10,11,12 | 1,2 |
| C409.6 | Explain about the overall management with the help of case studies. | 1,2,4,7,9,10,11,12 | 1,2 |

**Table.1 Mapping of COs, C, PSOs with POs - before CBS.**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C409.1 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C409.2 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C409.3 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C409.4 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C409.5 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C409.6 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C409.1 | 3 | 3 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |

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## C410: CE6016 Prefabricated Structures

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C410.1 | Explain the prefabricated elements and the construction methods. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C410.2 | Determine the importance and purpose of constructing the shear wall in building. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C410.3 | Explain the design of cross section based on efficiency of the materials. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C410.4 | Describe the different types of joints in precast connection. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C410.5 | Determine the loads for considering abnormal effects such as earthquakes, cyclones, etc. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C410.6 | Discuss the time management in prefabricated structures. | 1,2,3,4,7,9,10,11,12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C410.1 | 3 | 2 | 1 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C410.2 | 3 | 2 | 1 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C410.3 | 3 | 2 | 1 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C410.4 | 3 | 2 | 1 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C410.5 | 3 | 2 | 1 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C410.6 | 3 | 2 | 1 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C410 | 3 | 2 | 1 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |

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## C411: CE6021 Repair and Rehabilitation of Structures

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C411.1 | Explain the concepts of Repair and Rehabilitation, importance of maintenance and Assessment procedure for evaluating a damaged structure. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C411.2 | Apply the concept of durability aspects and properties of Concrete in damaged Structures. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C411.3 | Identify the quality of concrete, causes of deterioration and effects of cover thickness. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C411.4 | Explain the purposes of special concretes like Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, etc., | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C411.5 | Identify the techniques for repair and protection methods and Acquire knowledge in techniques of Strengthening of Structural elements and Demolition. | 1,2,3,4,7,9,10,11,12 | 1,2 |
| C411.6 | Discuss about the overall concept of rehabilitation and demolition works. | 1,2,3,4,7,9,10,11,12 | 1,2 |

**Mapping of COs, C, PSOs with POs**

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C411.1 | 3 | 2 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C411.2 | 3 | 2 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C411.3 | 3 | 2 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C411.4 | 3 | 2 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C411.5 | 3 | 2 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C411.6 | 3 | 2 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |
| C411 | 3 | 2 | 2 | 1 | - | - | 3 | - | 2 | 3 | 1 | 1 | 3 | 2 |

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## C412: CE8611 Project Work

After the course, the student should be able to:

| CO | Course Outcomes | POs | PSOs |
|---|---|---|---|
| C408.1 | Design engineering solutions to complex projects using fundamental knowledge, skills and attitudes of a professional engineer. | 1 - 12 | 1,2 |
| C408.2 | Identify project outcomes, constraints, deliverables, performance criteria, control needs, and resource requirements etc. | 1 - 12 | 1,2 |
| C408.3 | Demonstrate effective project execution that results in successful projects. | 1 - 12 | 1,2 |
| C408.4 | Interact with team members in a professional and ethical manner, respecting Differences, to ensure a collaborative project environment. | 1 - 12 | 1,2 |
| C408.5 | Communicate effectively to present ideas clearly and coherently both in the written and oral forms. | 1 - 12 | 1,2 |
| C408.6 | Apply independently and synthesize knowledge from various areas of learning, and critically and creatively apply it to real life situations. | 1 - 12 | 1,2 |

### Mapping of COs, C, PSOs with POs

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C408.1 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 2 |
| C408.2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 2 |
| C408.3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 2 |
| C408.4 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 2 |
| C408.5 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 2 |
| C408.6 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 2 |
| C408 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 2 |

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