

Eighth Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1	DE	CED---	Discipline Specific Elective	-	-	-	3
2	DE	CED---	Discipline Specific Elective	-	-	-	3
3	DE	CED---	Discipline Specific Elective	-	-	-	3
4	DE	CEC722	Project-II	0	0	8	4
5	GS	GSC808	ESP & SDP - VIII	2	0	0	2
6	INT	INT801	Internship/ Industrial Training	0	0	8	4
7	ECR	ECR833	Extracurricular Activities	-	-	-	-
Total							19

Students will undergo training/internship in the industry / research organization / reputed Institute during the vacation

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1	DE	CED809	Repair and Rehabilitation of Structures	3	0	0	3
2	DE	CED810	Air and Noise Pollution Control	3	0	0	3
3	DE	CED811	Matrix Method of Structural Analysis	3	0	0	3
4	DE	CED812	Ground Improvement Techniques	2	0	0	2
5	DE	CED813	Bridge Engineering	2	0	0	2

Repair & Rehabilitation of Structures

CED809

L-T-P: 3-0-0

Credits: 3

Pre-requisite: Fundamental ideas of building and construction materials. Basic knowledge of RCC and steel structure design.

Introduction: The subject explores the concept of Repair and strengthening techniques for different structures including bridge, building, towers etc. structural components, load bearing wall, panel walls; Strengthening of foundation; Grouting; Grout material, guniting, shotcreting, under pinning etc.

Course Outcomes (CO): Upon successful completion of this course, students should be able to:

CO1: Understand concept of repair and rehabilitation of structures.

CO2: Know the techniques for repair and rehabilitation of various structures.

CO3: Understand the procedure of Repair and strengthening of RCC and steel superstructure and foundation.

CO4: Know about techniques for Grouting; Grout material, guniting, shotcreting, under pinning.

CO5: Understand the methods for under-water repair; Durability of repairing material; Case histories.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1	3	3	3	3	3	3	3		3				3	
CO2	3	3	3	3	3	3	2		3				2	
CO3	3	2	3	3	3	3	3		3					
CO4	3	3	3	3	3		3		1				2	
CO5	3	3	3	1	3		3		3					

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module 1: Appraisal of damage and deterioration of structures by non-destructive and other techniques; Cause of deterioration.

Module 2: Environmental aspects and earthquake effects; Repair and strengthening of superstructure – structural components, loadbearing wall, panel walls; Strengthening of foundation; Grouting; Grout material, guniting, shotcreting, under pinning.

Module 3: Repair of steel structures – bridge, building, towers etc., monuments and historical structures. Prevention of water leakage in structures; Under-water repair; Durability of repairing material; Case histories.

Textbook

1. Woodson, R. D. (2009). Concrete structures: protection, repair and rehabilitation. Butterworth-Heinemann.
2. Radomski, W. (2002). Bridge rehabilitation.

NPTEL/MOOCs Links

<https://archive.nptel.ac.in/courses/105/105/105105213/>

Air and Noise Pollution Control

CED810

L-T-P: 3-0-0

Credits: 3

Pre-requisite: Fundamental ideas of Environmental engineering and Engineering Chemistry.

Introduction: The subject will explore the basic concepts of Environmental Pollution and Control. The students will have a clear idea of the various types of pollution, their sources and effects. The concept of Air Pollution Meteorology will also be discussed in details. This subject also addresses the global environmental issues like ozone depletion, acid rain and Global Warming Green House Effects.

Course Outcomes (CO):

Upon successful completion of this course, students should be able to:

CO1: Develop a clear concept of the types of pollution like air pollution, their sources and effects.

CO2: Understand the concept of noise pollution.

CO3: Understand the concept of water pollution

CO4: Address the global environmental issues like ozone depletion, acid rain and Global Warming Green House Effects.

CO5: To learn about different functions of pollution regulatory bodies.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1	3	3	3	3			3		3				2	2
CO2	3	3	3	3					3				2	
CO3		2	3	3	3		3	3	1				2	
CO4		3	3	2					3					
CO5		3	3	3			3		3					2

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module 1: Introduction: Environment. Pollution, Pollution control Air Pollution: Air Pollutants: Types, Sources, Effects; Air Pollution Meteorology: Lapse Rate, Inversion, Plume Pattern; Air Pollution Dispersion Model: Point Source Gaussian Plume Model, Stability Classes, Stability Charts, Design of Stack Height.

Module 2: Air pollution Control: Self cleansing properties of the environment; Dilution method; Engineered Control of Air Pollutants: Control of the particulates, Control of Gaseous Pollutants, Control of Air pollution from Automobiles.

Noise Pollution: Definition; Sound Pressure, Power and Intensity; Noise Measurement: Relationships among Pressure, Power and Intensity, Levels, Frequency Band, Decibel Addition, Measures of community Noise i.e. LN, Leq, Ldn,, LNP; Sources, ; Effects; Control.

Module 3: Water pollution: Pollution Characteristics of Typical Industries, Suggested Treatments. Global Environmental Issues: Ozone Depletion, Acid Rain, Global Warming-Green House Effects.

Module 4: Administrative Control on Environment: Functions of Central and State Pollution Control Boards; Environmental Clearance Process for Industries and Infrastructural Projects Environmental Laws: Water Act, Air Act, Motor Vehicle Act

Text Books

1. Introduction to Environmental Engineering and Science G. Masters, W. Ela PHI.
2. Environmental Engineering: A Design Approach A. Sincero, G. Sincero PHI.
3. Environmental Engineering P. V. Rowe TMH.

References

1. Environmental Engineering, S.K . Garg, Khanna Publishers.
2. Air Pollution Rao and Rao TMH.
3. Water Supply, Waste Disposal and Environment Pollution Engineering A.K.Chatterjee Khanna Publishers.

NPTEL/MOOCs Links

<https://archive.nptel.ac.in/courses/105/107/105107213/>

<https://www.coursera.org/learn/air-pollution-health-threat>

Matrix Method of Structural Analysis

CED811

L-T-P: 3-0-0

Credits: 3

Pre-requisite: Fundamental ideas of Solid mechanics, Basic knowledge of Engineering Mechanics, Structural Analysis.

Introduction: The subject discussed in details the matrix method of analysis of structures which involves flexibility matrices and stiffness matrices. The subject also deals with flexibility method for fixed and continuous beams and stiffness methods for grids. The concept of flexibility method for plane frames and stiffness method for space frames are also discussed in details.

Course Outcomes (CO): Upon successful completion of this course, students will develop a clear understanding of:

CO1 Force Transformation Matrix, Member Flexibility matrix, Construction of structure flexibility matrix. Matrix determination of the displacement vector, Determination of member forces.

CO2: The students will also develop a clear understanding of the kinematically indeterminate structures.

CO3: The concept of matrix concepts and matrix analysis of structures are also explained in details. The stiffness and flexibility matrix approaches are also dealt with. **CO4:** The students will develop an understanding of fundamentals of the stiffness method, equivalent joint loads, Displacement and Transformation matrix. Member stiffness matrix, Total or System stiffness matrix.

CO5: The students will also develop an understanding of continuous beam and rigid frame

analysis with axially rigid members by stiffness method using Displacement Transformation Matrix.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1	3	3	3		3		3		3				2	
CO2	3	3	3	3	3				3				2	
CO3			2			3	3	2					2	
CO4		3	3	3		1								
CO5		3		3		3		3						

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module 1: Introduction to Flexibility Method of Matrix Analysis: Introduction to flexibility method, Element flexibility matrix, Principle of contra gradient, Force Transformation Matrix, Member Flexibility matrix, Construction of structure flexibility matrix. Matrix determination of the displacement vector, Determination of member forces.

Module 2: Analysis of Beams and Frames using Flexibility Method: Analysis of axially rigid continuous beams by flexibility method using Force Transformation Matrix, Analysis of rigid plane frames with axially rigid members by flexibility method using Force Transformation Matrix.

Module 3: Introduction to Stiffness Method of Matrix Analysis: Fundamentals of the stiffness method, equivalent joint loads, Displacement and Transformation matrix. Member stiffness matrix, Total or System stiffness matrix.

Module 4: Analysis of Beams and Frames using Stiffness Method: Continuous Beam and rigid frame analysis with axially rigid members by stiffness method using Displacement Transformation Matrix.

Module 5: Introduction to Finite Element Method.

Text Books

1. Matrix Methods of Structural Analysis M.B. Kanchi.
2. Analysis of Structures T.S. Thandavamoorthy Oxford University Press.

Reference Books

1. Intermediate Structural Analysis C.K. Wang Mc Graw Hill.
2. Theory of Elasticity Timoshenko & Goodier McGraw-Hill.

NPTEL/MOOCs Links

<https://archive.nptel.ac.in/courses/105/105/105105180/>

Ground Improvement Techniques

CED812

L-T-P: 2-0-0

Credits: 3

Pre-requisite: Fundamental knowledge of Geotechnical Engineering.

Introduction: The subject explores the concept of various ground improvement techniques including in-situ densification, Compaction methods, Vibration at ground surface, Impact at ground surface, Design of Sand drains and Stone columns, Electrical and thermal methods, Geotextiles in filtration and drainage, erosion control, Grouting, Reinforced earth fundamentals, Soil nailing, Soil and Rock Anchors, Underpinning etc.

Course Outcomes (CO): Upon successful completion of this course, students should be able to:

CO1: Understand the concept of ground improvement techniques.

CO2: Know the methods of densification of Granular and Cohesive Soils.

CO3: Understand the Methods for Design of Sand drains and Stone columns.

CO4: Know about different Grouting equipment and methods, Grout design and layout, Grout monitoring schemes.

CO5: Understand various methods of soil stabilization.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1	3	3	3	3	3	3	3		3				2	
CO2	3	3	3	3	3	3			3					
CO3		2	3	2	3	3	3		1				2	
CO4		3	3	3	3	2			3				2	
CO5		3	3	3	3	3	3		3					

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module 1: Insitu densification: Introduction, Compaction: methods and controls Densification of granular soil: Vibration at ground surface, Impact at ground surface, Vibration at depth (Vibroflotation), Impact at depth. Densification of Cohesive Soils: Preloading and dewatering, Design of Sand drains and Stone columns, Electrical and thermal methods

Module 2: Geo-textiles: Over view: Geotextiles as separators, reinforcement. Geotextiles in filtration and drainage, geotextiles in erosion control.

Module 3: Grouting: Over view: Suspension and Solution grout, Grouting equipment and methods, Grout design and layout, Grout monitoring schemes

Module 4: Soil stability: Reinforced earth fundamentals, Soil nailing, Soil and Rock Anchors, Underpinning

Textbooks:

1. Kirsch, K., & Bell, A. (Eds.). (2012). Ground improvement. CRC Press.
2. Raj, P. P. (1999). Ground improvement techniques (HB). Firewall Media.

NPTEL/MOOCs Links

<https://archive.nptel.ac.in/courses/105/105/105105210/>

Bridge Engineering

CED813

L-T-P: 2-0-0

Credits: 2

Pre-requisite: Fundamental ideas of Solid mechanics, Basic knowledge of Engineering Mechanics, Structural Analysis.

Introduction: The subject introduces the concept of bridge engineering to the young civil engineering minds. The subject broadly covers the following topics: Reinforced Concrete Solid Slab Bridge, Beam and Slab Bridges, Steel Bridges, Composite Bridges and Cable Stayed Bridges.

Course Outcomes (CO): Upon successful completion of this course, students will develop a clear understanding of:

CO1: The students are exposed to fundamentals of bridge engineering design.

CO2: They will have a clear idea of general design features, design of interior panel of slab.

CO3: The students will have a clear concept of components of bridges and basic classification of bridges.

CO4: They will also have a clear idea of the cable stayed bridges and plate girder bridges. They will have a clear idea of elements and design of plate girder bridges.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1	3		3	3			3		3				3	2
CO2	3	3		3	3									
CO3			2	3		2	3	1	3				3	2
CO4		3	3	3		3								

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module 1: Introduction: Definition and Basic Forms, Component of bridge, classification of bridge, short history of bridge development. I.R.C Loads. Analysis of IRC Loads, Impact factors, other loads to be considered, Importance of Hydraulic factors in Bridge Design.

Module 2: Reinforced concrete solid slab bridge: Introduction, General design features, Effective-width method. Simply supported and cantilever Slab Bridge, analysis and design Box Culvert: Introduction, Design method and Design example.

Module 3: Beam and Slab Bridges Introduction, Design of interior panel of slab. Pigeauds method, Design of longitudinal girder, Calculation of longitudinal moment, design example. Balanced Cantilever Bridges: General Features, Arrangement of supports, design features Articulation, Design example.

Module4: Steel Bridges: General features, types of stress, Design example. Plate Girder Bridge: Elements, design, lateral bracing, Box- girder Bridges.

Module 5: Composite Bridges: General aspects, method of construction, analysis of composite section, shear connectors, design of composite beam. Cable Stayed Bridge: General features, Philosophy of design.

Text Books

1. Principle & Practice of Bridge Engineering S.P. Bindra– Dhanpat Rai Pub.
2. Essentials of bridge engineering D.J. Victor.
3. Bridge engineering Ponnuswamy.

References

1. Design of Bridge Structures T.R. Jagadesh, M.A. Jayaram.
2. Bridge engineering by Krishnaraju.
3. Design of concrete bridges by Aswani, Vizirani , Ratwani.

NPTEL/MOOCs Links

<https://archive.nptel.ac.in/courses/105/105/105105216/>

ESP & SDP –VIII**GSC808****L-T-P: 0-1-0****Credits: 1****Pre-requisite:** Basic concepts in mathematics and English languages.

Introduction: This course examines current event of national importance. The Topics to be covered (tentatively): The course is on Mock tests of UPSC Prelims CSAT-I & UPSC CSAT-II etc, Indian & World Geography, Indian Polity & Governance, Economic & Social Development, General issues on Environmental ecology.

Course Outcomes (CO): In this course we will study the basic components of world Geography. Students are expected to be capable of understanding the Indian Polity & Governance, their advantages and drawbacks, how to implement them in Economic & Social Development, how their drawbacks can be overcome and what the applications are and where they can be used. To reach this goal, the following objectives need to be met:

CO1: Students would be able to know Indian Economic & Social system.

CO2: Students would be able to know Indian Polity & Governance.

CO3: By analyzing the logic of national importance and policy.

CO4: To become an efficient citizen of India.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1	3	3	2		3							3		
CO2	3			3								3		
CO3	2	3	3									3		
CO4	3	3	3		3							3		

3 – High; 2 – Medium; 1 – Low

Course Contents:**Section A: Employment Enhancement Skills-VIII**

Module-1 Stream wise GATE, IES, UPSE syllabus Mock tests of IES, UPSC Prelims CSAT-I

Section B: Skill Development for Professional-VIII

Module-1: Current events of National & International importance, History of India & Indian

National Movement.

Module-2: Indian & World Geography – Physical, Social, Economic Geography of India & the World.

Module-3: Indian Polity & Governance – Constitution, Political System, Panchayati Raj, Public Policy, Rights Issues, etc.

Module-4: Economic & Social Development – Sustainable Development, Poverty, Inclusion, Demographics, Social Sector Initiatives, etc.

Module-5: General issues on Environmental ecology, Bio-diversity & climate change – that do not require subject specialization. General Science.