



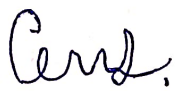
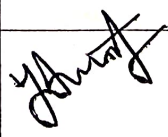
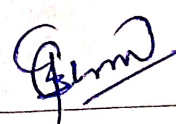
BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
ODALAREVU
DEPARTMENT OF CIVIL ENGINEERING

COURSE STRUCTURE AND SYLLABUS

R25 Regulations

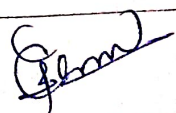
M.Tech (Structural Engineering) Programme

(Applicable for Batches Admitted from 2025-26)

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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COURSE STRUCTURE AND SYLLABUS- R25 Regulations

M.Tech (Structural Engineering) Programme

(Applicable for Batches Admitted from 2025-26)

I Year-I Semester

S.No	Category	Course Code	Course Name	L	T	P	C
1	Program Core-1	25SE1T01	Theory of Elasticity	3	1	0	4
2	Program Core-2	25SE1T02	Structural Dynamics	3	1	0	4
3	Program Core-3	25SE1T03	Matrix Analysis of Structure	3	1	0	4
4	Elective		Program Elective -I	3	0	0	3
		25SE1D01	a) Experimental Stress Analysis				
		25SE1D02	b) Analytical & Numerical Methods for Structural Engineering				
		25SE1D03	c) Design of Reinforced Concrete Foundation				
		25SE1D04	d) Structural Optimization				
5	Elective		Program Elective II	3	0	0	3
		25SE1D05	a) Bridge Engineering				
		25SE1D06	b) Repair and Rehabilitation of Structures				
		25SE1D07	c) Advanced Reinforced Concrete Design				
		25SE1D08	d) Fracture Mechanics				
6	Laboratory-1	25SE1L01	Advanced Concrete Technology Laboratory	0	1	2	2
7	Laboratory-2	25SE1L02	Advanced Structural Engineering Laboratory	0	1	2	2
8	Audit	25SE1S01	Seminar -I	0	0	2	1
Total Credits							23

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I Year- II Semester

S.No.	Category	Course Code	Course Name	L	T	P	C
1	Program Core-4	25SE2T04	Finite Element Methods in Structural Engineering	3	1	0	4
2	Program Core-5	25SE2T05	Earthquake Resistant Design	3	1	0	4
3	Program Core-6	25SE2T06	Stability of Structures	3	1	0	4
4	Elective		Program Elective III	3	0	0	3
		25SE2D09	a) Analysis of Tall Structures				
		25SE2D10	b) Advanced Steel Design				
		25SE2D11	c) Analysis of Offshore Structures				
		25SE2D12	d) Structural Health Monitoring				
5	Elective		Program Elective IV	3	0	0	3
		25SE2D13	a) Theory of Plates and Shells				
		25SE2D14	b) Precast and Prefabricated Structures				
		25SE2D15	c) Earth Retaining Structures				
		25SE2D16	d) Industrial Structures				
6	Laboratory - 3	25SE2L03	Computer Aided Design Laboratory	0	1	2	2
7	Laboratory - 4	25SE2L04	Structural Design Laboratory	0	1	2	2
8	Audit	25SE2S02	Seminar -II	0	0	2	1
Total Credits							23

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II Year-I Semester

S.No.	Category	Code	Course Name	L	T	P	C
1	Elective	25HM3D01	RESEARCH METHODOLOGY & IPR / SWAYAM 12 WEEK MOOC COURSE ON RM & IPR	3	0	0	3
2	Proj	25SE3P01	Summer Internship/ Industrial training (8-10 weeks)**	--	--	--	3
3	Proj	25SE3V01	Comprehensive Viva***	--	--	--	2
4	Proj	25SE3P02	Dissertation Part-A****	--	--	20	10
Total Credits							18

* Student Attended Summer/ Year Break and Assessment will be done in 3rd Sem

**Comprehensive viva can be conducted courses completing upto Second Semester

*** Dissertation –Part A, Internal Assessment

II Year- II Semester

Sl No.	Category	Code	Course Name	L	T	P	C
1	Proj	25SE4P03	Project / Dissertation Part-B ****	0	0	32	16
Total Credits							16

**** External Assessment

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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I Semester	25SE1T01	THEORY OF ELASTICITY	L	T	P	C
			3	1	0	4

Course Objectives:

1	To introduce the fundamentals of stress, strain, Hooke's law, plane stress/strain, equilibrium, compatibility, and stress functions.
2	To develop methods for solving two-dimensional elasticity problems in rectangular coordinates using polynomials, Fourier series, and beam bending theory.
3	To analyze axisymmetric stress and strain problems in polar coordinates, including stress concentration around circular holes.
4	To study principal stresses, maximum shear stress, compatibility, superposition, uniqueness, and reciprocal theorems in 3D elasticity.
5	To understand torsional behavior of prismatic bars with different cross-sections and solve torsion using analytical and energy methods.

Course Outcomes: At the end of the course,

CO1	Students will be able to formulate and solve elasticity problems using equilibrium, boundary, and compatibility conditions.
CO2	Students will be able to analyze 2D stress, displacement, and bending problems in rectangular coordinate systems.
CO3	Students will be able to compute stresses, strains, and displacements in polar coordinates and evaluate stress concentration effects.
CO4	Course Outcome: Students will be able to determine 3D stress states and apply fundamental theorems to solve elasticity problems.
CO5	Students will be able to analyze torsion in bars of various shapes using classical, membrane analogy, and energy methods.

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Detailed Syllabus:

UNIT: 1

Elasticity – Notation for forces and stresses – components of stresses and strains – Hooke's Law - Plane Stress – Plane strain – Differential Equations of equilibrium – Boundary conditions – Compatibility equations - Stress function – Boundary Conditions.

UNIT: 2

Two dimensional problems in rectangular co-ordinates – Solution by polynomials – Saint Venant's principle – Determination of displacements – Bending of simple beams – Application of Fourier series for two dimensional problems for gravity loading

UNIT: 3

Two dimensional problems in polar co-ordinates - General equations in polar co-ordinates – Stress distribution for problems having symmetrical about an axis - Strain components in polar co-ordinates– Displacements for symmetrical stress distributions - Stresses for plates with circular holes subjected to far field tension – stress concentration factor.

UNIT: 4

Analysis of stress and strain in three dimension - Principal stresses – Stress ellipsoid and stress director surface – Determination of principal stresses - Maximum shear stress – Homogeneous Deformation – General Theorems - Differential equations of equilibrium – Conditions of compatibility– Equations of equilibrium in terms of displacements – Principle of superposition – Uniqueness of solution –Reciprocal theorem..

UNIT: 5

Torsion of Prismatical bars – Bars with elliptical cross section – Other elementary solution – Membrane analogy – Torsion of rectangular bars – Solution of Torsional problems by energy method.

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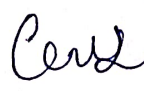
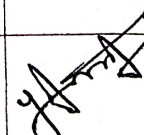
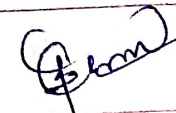
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TEXT BOOKS

1. Theory of Elasticity – Stephen P. Timoshenko & J. N. Goodier – 3rd Edition, 1970-McGraw-Hill Publishers
2. Elasticity: Theory, Applications, and Numerics – Martin H. Sadd – 5th Edition, 2025-Academic Press, Elsevier
3. Mathematical Theory of Elasticity – I. S. Sokolnikoff – 2nd Edition, 1956-McGraw-Hill Publishers

REFERENCES

1. Elasticity: Theory, Applications, and Numerics – Martin H. Sadd – Academic Press (Elsevier) – 5th Edition – 2025
2. Theory of Elasticity – Sadhu Singh – Khanna Publishers – 4th Edition – 2004

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I Semester	25SE1T02	STRUCTURAL DYNAMICS	L	T	P	C
			3	1	0	4

Course Objectives:

1	Introduce the fundamentals of vibrations and dynamic analysis of structures.
2	Develop mathematical models of single degree of freedom (SDOF) and multi degree of freedom (MDOF) systems.
3	Apply various principles and methods to formulate and solve equations of motion for structural systems.
4	Analyze vibration responses of discrete and continuous systems under different types of loadings.
5	Introduce earthquake excitations and methods for evaluating seismic response of structures.

Course Outcomes: At the end of the course,

CO1	Understand and analyze free, damped, and forced vibrations of SDOF systems.
CO2	Formulate equations of motion using Newton's law, D'Alembert's principle, virtual work, and Hamilton's principle.
CO3	Determine natural frequencies, mode shapes, and dynamic response of MDOF systems using modal analysis.
CO4	Apply approximate methods and analytical techniques to compute vibration characteristics of continuous systems such as beams.
CO5	Evaluate earthquake response of structures, including multi-storey buildings, using elastic and linear static methods.

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Detailed Syllabus:

UNIT I:

Theory of vibrations: Introduction - Elements of vibratory system - Degrees of Freedom - Continuous System - Lumped mass idealization - Oscillatory motion - Simple Harmonic motion

- Victorian representation of S.H.M. - Free vibrations of single degree of freedom system - undamped and damped vibrations - critical damping - Logarithmic decrement - Forced vibration of SDOF systems - Harmonic excitation - Vibration Isolation - Dynamic magnification factor – Phase angle.

UNIT II

Introduction to Structural Dynamics : Fundamental objectives of dynamic analysis -Types of prescribed loading - Methods of discretization - Formulation of equations of motion by different methods – Direct equilibration using Newton's law of motion / D'Alembert's Principle, Principle of virtual work and Hamilton principle. **Single Degree of Freedom Systems :** Formulation and solution of the equation of motion – Free vibration response - Response to Harmonic, Periodic, Impulsive and general dynamic loadings - Duhamel integral.

UNIT III

Multi Degree of Freedom Systems : Selection of the degrees of Freedom - Evaluation of structural property matrices - Formulation of the MDOF equations of motion -Undamped free vibrations - Solutions of Eigen value problem for natural frequencies and mode shapes - Analysis of Dynamic response – Normal co-ordinates - Uncoupled equations of motion - Orthogonal properties of normal modes - Mode superposition procedure.

UNIT IV

Practical Vibration Analysis: Introduction - Stodola method - Fundamental mode analysis - Analysis of second and higher modes - Holzer method - Basic procedure.

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Continuous Systems: Introduction - Flexural vibrations of beams - Elementary case - Derivation of governing differential equation of motion - Analysis of undamped free vibrations of beams in flexure - Natural frequencies and mode-shapes of simple beams with different end conditions - Principles of application to continuous beams.

UNIT V

Introduction to Earthquake Analysis: Deterministic Earthquake Response: Systems on Rigid Foundations -Types of Earthquake Excitations - Lumped SDOF Elastic Systems, Translational Excitations -Generalized coordinate -SDOF Elastic Systems, Translational Excitations, Linear Static Method - Analysis for obtaining response of multi storied RC Building.

TEXT BOOKS

1. Structural Dynamics – Anil K. Chopra – Prentice Hall Publishers – 6th Edition – 2022
2. Structural Dynamics: Theory & Computation – Mario Paz – CBS Publishers & Distributors – 6th Edition – 2018
3. Elementary Structural Dynamics – V. K. Manicka Selvam – Dhanpat Rai Publishers – 2021

REFERENCE:

1. Dynamics of Structures – Ray W. Clough & Joseph Penzien – Computers & Structures Inc. – 2nd Edition – 2003
2. Theory of Vibration – William T. Thomson – Springer – 4th Edition – 1996
3. Mechanical Vibrations – S. S. Rao – Pearson – 6th Edition – 2017
4. Structural Dynamics of Earthquake Engineering – S. Rajasekaran – CRC Press – 1st Edition – 2009

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I Semester	25SE1T03	MATRIX ANALYSIS OF STRUCTURE	L	T	P	C
			3	1	0	4

Course Objectives:

1	Introduce the fundamentals of matrix methods of structural analysis including stiffness and flexibility approaches.
2	Develop element stiffness matrices for truss, beam, torsional, grid, and space frame elements.
3	Formulate and assemble global stiffness equations for different structural systems.
4	Apply stiffness method to analyze trusses, beams, frames, grids, and beams on elastic foundation.
5	Understand advanced topics such as band width reduction, static condensation, substructuring, and load/displacement effects.

Course Outcomes: At the end of the course,

CO1	Identify static and kinematic indeterminacy and formulate element force-displacement relations for basic structural elements.
CO2	Assemble global stiffness matrices and analyze determinate and indeterminate structures like trusses, continuous beams, and plane frames.
CO3	Apply stiffness method to grid structures, tapered and curved beams, and perform coordinate transformations.
CO4	Incorporate effects of support displacements, temperature loads, and elastic foundations using stiffness method.
CO5	Analyze space trusses and space frames using member stiffness matrices and transformation matrices between local and global coordinates.

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Detailed Syllabus:

UNIT: 1

Introduction of matrix methods of analysis – Static and kinematic indeterminacy – Degree of freedom– Structure idealization-stiffness and flexibility methods – Suitability: Element stiffness matrix for truss element, beam element and Torsional element- Element force - displacement equations.

UNIT: 2

Stiffness method – Element and global stiffness equation – coordinate transformation and global assembly – structure stiffness matrix equation – analysis of simple pin jointed trusses – continuous beams – rigid jointed plane frames

UNIT: 3

Stiffness method for Grid elements – development of stiffness matrix – coordinate transformation. Examples of grid problems – tapered and curved beams

UNIT: 4

Additional topics in stiffness methods – discussion of band width – semi band width – static condensation – sub structuring –Loads between joints-Support displacements- inertial and thermal stresses-Beams on elastic foundation by stiffness method.

UNIT: 5

Space trusses and frames - Member stiffness for space truss and space frame– Transformation matrix from Local to Global – Analysis of simple trusses, beams and frames

TEXT BOOKS

1. Matrix Analysis of Structures – Robert E. Sennett – Prentice Hall, Englewood Cliffs (NJ) – 1994
2. Advanced Structural Analysis – P. Dayaratnam – Tata McGraw-Hill, New Delhi – 1978

REFERENCES

1. Statically Indeterminate Structures – C. K. Wang – McGraw-Hill India – 1st Edition – 2017
2. Structural Analysis: A Matrix Approach – G. S. Pandit & S. P. Gupta – McGraw-Hill Education India – 2nd Edition – 2008.

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I Semester	25SE1D01	EXPERIMENTAL STRESS ANALYSIS	L 3	T 0	P 0	C 3
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Course Objectives:

1	Introduce the fundamentals of model analysis, strain measurement methods, and properties of strain gauge systems.
2	Develop knowledge on electrical resistance strain gauges, their construction, adhesives, mounting, and analysis of strain data.
3	Provide an understanding of non-destructive testing methods for assessing material and structural behavior.
4	Explain the theory of photoelasticity and stress optic law in analyzing stress distribution.
5	Introduce two-dimensional photoelastic methods, fringe analysis, calibration, and materials used in photoelastic studies.

Course Outcomes: At the end of the course,

CO1	Understand model design, dimensional analysis, and different methods of strain measurement.
CO2	Select and apply suitable electrical resistance strain gauges and analyze strain data using rosettes and corrections.
CO3	Apply non-destructive testing techniques such as ultrasonic pulse velocity, rebound hammer, and acoustic emission for material evaluation.
CO4	Explain the theory of photoelasticity and interpret fringe patterns using polariscope arrangements.
CO5	Analyze two-dimensional photoelastic problems using isochromatic and isoclinic fringes, compensation and calibration methods, and select suitable photoelastic materials

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Detailed Syllabus:

UNIT-I

Introduction and Strain measurement methods – Model & Prototype – Dimensional analysis- Factors influencing model design – Scale factors and Model material properties – Methods of model design. Definition of strain and its relation to experimental determinations - properties of strain gauge systems – Mechanical, Optical, Acoustic and Pneumatic types

UNIT-II

Electrical resistance strain gages: Introduction – gauge construction – strain gauge adhesives - mounting methods – gauge sensitivities and gage factor – performance characteristics of wire and foil strain gauges – environmental effects. Analysis of strain gauge data – the three element rectangular rosette – the delta rosette – correction for transverse sensitivity.

UNIT-III

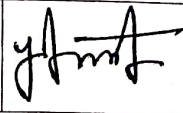
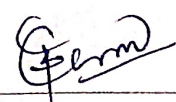
Non – destructive testing: Introduction – objectives of non destructive testing. Ultrasonic pulse velocity method – Rebound Hammer method (Concrete hammer) – Acoustic Emission- application to assessment of concrete quality.

UNIT-IV

Theory of photo elasticity: Introduction – temporary double refraction – Index ellipsoid and stress ellipsoid – the stress optic law – effects of stressed model in a Polariscope for various arrangements
- fringe sharpening.

UNIT-V

Two dimensional photo elasticity: Introduction – Iso-chromatic fringe patterns – isoclinic fringe patterns – compensation techniques – calibration methods – separation methods – materials for photo- elasticity – properties of photo-elastic materials.

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DEPARTMENT OF CIVIL ENGINEERING**

TEXT BOOKS

1. Experimental Stress Analysis – William F. Riley & James W. Dally – McGraw-Hill – 3rd Edition – 1991
2. Experimental Stress Analysis – Sadhu Singh – Khanna Publishers – 2006

REFERENCE:

1. An Introduction to Experimental Stress Analysis – George Hamor Lee – Wiley Publishers – 1st Edition – 1950.
2. Experimental Stress Analysis – Sadhu Singh – Khanna Publishers – 4th Edition – 1981.
3. Solid Mechanics – S. M. A. Kazimi – McGraw-Hill – 1st Edition – 1976.

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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I Semester	25SE1D02	ANALYTICAL & NUMERICAL METHODS FOR STRUCTURAL ENGINEERING	L	T	P	C
			3	0	0	3

Course Objectives:

1	Introduce transform methods (Laplace and Fourier) and their applications in solving wave and heat conduction problems.
2	Develop understanding of elliptic equations, calculus of variations, and direct methods for functional optimization.
3	Provide knowledge on integral equations, Green's functions, and iterative solution techniques.
4	Apply finite difference methods for differentiation, integration, boundary value problems, and structural applications like beams, columns, and plates.
5	Impart numerical differentiation and integration methods with practical applications to structural deflection and slope calculations.

Course Outcomes: At the end of the course,

CO1	Solve one-dimensional wave and heat conduction problems using Laplace and Fourier transforms.
CO2	Apply calculus of variations and direct methods (Ritz, Kantorovich) for solving functional optimization problems.
CO3	Formulate and solve integral equations using Green's functions and iterative methods.
CO4	Use finite difference methods for differentiation, integration, and solving characteristic value problems in structural analysis.
CO5	Perform numerical differentiation and integration, and apply them to compute slopes and deflections in structural members.

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Detailed Syllabus

UNIT-I

Transform Methods- Laplace transform methods for one-dimensional wave equation - Displacements in a long string - Longitudinal vibration of an elastic bar - Fourier transforms methods for one-dimensional heat conduction problems in infinite and semi-infinite rod

UNIT-II

Elliptic Equations- Laplace equation - Properties of harmonic functions - Fourier transform methods for Laplace equation

Calculus Of Variations- Variation and its properties - Euler's equation - Functionals dependent on first and higher order derivatives - Functionals dependent on functions of several independent variables - Some applications - Direct methods - Ritz and Kantorovich methods

UNIT-III

Integral Equations- Fredholm and Volterra integral equations - Relation between differential and integral equations - Green's function - Fredholm equation with separable kernel - Iterative method for solving equations of second kind

UNIT-IV

Finite Difference and their Applications: Introduction- Differentiation formulas by interpolating parabolas - Backward and forward and central differences- Derivation of Differentiation formulas using Taylor series- Boundary conditions- Beam deflection - Solution of characteristic value problems - Richardson's extrapolation - Use of unevenly spaced pivotal points- Integration formulae by interpolating parabolas- Numerical solution to spatial differential equations - Application to Simply Supported Beams, Columns & rectangular Plates.

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UNIT-V

Numerical Differentiation: Difference methods based on undetermined coefficients- optimum choice of step length- Partial differentiation. Numerical Integration: Method based on interpolation-method based on undetermined coefficient – Gauss – Lagrange interpolation method- Radaua integration method- composite integration method – Double integration using Trapezoidal and Simpson's method – New Marks Method and Application to Beams – Calculations of Slopes & Deflections.

TEXT BOOKS

1. Introduction to Partial Differential Equations – K. Sankara Rao – PHI, New Delhi – 3rd Edition-2022
2. Numerical Methods for Scientific and Engineering Computations – M. K. Jain, S. R. K. Iyengar & R. K. Jain – New Age International – 6th Edition – 2022
3. Higher Engineering Mathematics for Engineering and Sciences – M. K. Venkataraman – National Publishing Company, Chennai– 1965

REFERENCE

1. Differential Equations and the Calculus of Variations – L. Elsgolts – Mir Publishers, Moscow – 3rd Reprint – 1977
2. Fundamentals of Mathematical Statistics – S. C. Gupta & V. K. Kapoor – Sultan Chand & Sons, New Delhi – 12th Revised Edition – 2020
3. Numerical Methods for Engineering Problems – N. Krishna Raju & K. U. Muthu – Macmillan Publishers India – 1st Edition – 2000.

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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I Semester	25SE1D03	DESIGN OF REINFORCED CONCRETE FOUNDATIONS	L	T	P	C
			3	0	0	3

Course Objectives:

1	Introduce the principles of foundation structures, load effects, and design of isolated footings and pedestals.
2	Develop knowledge on the design of wall footings and strip footings under different loading conditions.
3	Provide an understanding of raft foundations including rigid, flexible, flat slab, and beam-slab rafts with design procedures.
4	Explain the analysis and design of combined piled raft foundations, circular rafts, and annular rafts.
5	Introduce the design of under-reamed pile foundations, grade beams, and retaining walls for various soil and load conditions.

Course Outcomes: At the end of the course,

CO1	Design isolated square, rectangular, and plain concrete footings along with pedestals using IS code provisions.
CO2	Design wall footings, continuous strip footings, and strip footings under several columns with detailing requirements.
CO3	Analyze and design rigid and flexible raft foundations, flat slab rafts, and beam-slab rafts including reinforcement detailing.
CO4	Evaluate the behavior and design of combined piled raft foundations, circular and annular rafts, and ring beams under various loading conditions.
CO5	Design under-reamed pile foundations for expansive soils and reinforced concrete retaining walls including cantilever and basement walls.

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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UNIT – I

Foundation Structures & Design of Centrally Loaded Isolated Footings and Column Pedestals – Introduction, Rigid and Flexible Foundations, Loads and their Effects, Design Requirements, Geotechnical Design, Empirical and Exact Methods of Analysis of foundations, Design Loads for Foundations, Recommended Approach to Structural Design of Foundations.

Introduction, General Procedure for Design, Design of Square Footing of Uniform Depth (Pad Footing), Design of sloped Rectangular Footings, Design Procedure, Detailing of Steel, Design of Rectangular Pad Footings, Design of Plain Concrete Footings, Design of Pedestals, Design Calculation for Pedestals.

UNIT - II

Wall Footings – Introduction Simple Plain Concrete Wall Footings, Reinforced Concrete Continuous Strip Wall Footings, Design of continuous Strip Wall Footings, Design for Longitudinal Steel, R.C. T Beam Footings in Shrinkable Soils, Foundations of Partition Wall in Ground Floors, Summary.

Strip Footings Under Several Columns – Introduction, Design Procedure for Equally loaded and Equally Spaced Columns, Analysis of Continuous Strip Footing for Unsymmetric Loading, Analysis of Strip Footing with Unsymmetrical Loads, Detailing of Members

UNIT – III

Raft Foundations – Introduction, Rigid and Flexible Foundations, common Types of Rafts, Deflection Requirements of Beams and Slabs in Rafts, General considerations in Design of Rigid Rafts, Types of Loadings and Choice of Rafts, Record of Contact Pressures Measured Under Rafts, Modern Theoretical Analysis.

Design of Flat Slab Rafts-Mat Foundations – Introduction, Components of Flat Slabs, Preliminary Planning of Flat Slab Rafts, Analysis of Flat Slab by Direct Design Method, Method of Analysis, Values for Longitudinal Distribution and Transverse, Redistribution,

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Shear in Flat Slabs, Bending of Columns in flat Slabs, Limitations of Direct Design Method for Mats, Detailing of Steel, Design of Edge Beam in Flat Slabs.

Beam and Slab Rafts – Introduction, Planning of the Raft, Action of the Raft, Approximate Dimensioning of the Raft, Design of the Beam and Slab Raft under Uniform Pressure, Structural Analysis for the Main Slab, Design of Secondary and Main Beams, Analysis by Winkler Model, Detailing of Steel.

UNIT - IV

Combined Piled Raft Foundations (CPRF) – Introduction, Types and uses of Piled Rafts, , Interaction of Pile and Raft, Ultimate Capacity and Settlement of Piles, Estimation of Settlement of Raft in Soils, Allowable Maximum and Differential Settlement in Buildings, Design of CPRF System, conceptual Method of Design, Conceptual Method of Analysis, Distribution of Piles in the Rafts, Theoretical Methods of Analysis.

Circular and Annular Rafts – Introduction, Positioning of chimney Load on Annular Raft, Forces Acting on Annular Rafts, Pressures Under Dead Load and Moment, Methods of Analysis, Conventional Analysis of Annular Rafts, Analysis of Ring Beams Under circular Layout of Columns, Analysis of Ring Beam Transmitting Column Load to Annular Rafts, Detailing of Annular Raft Under Columns of a Circular Water Tank.

UNIT – V

Under-reamed Pile Foundations – Introduction, Safe Loads on Under-reamed Piles, Design of Under-reamed Pile Foundation for Load Bearing Walls of Buildings, Design of Grade Beams, Design of Under-reamed Piles Under Columns of Buildings, Use of Under-reamed Piles for Expansive Soils.

Design of cantilever and Basement Retaining Walls – Introduction, Earth Pressure and Rigid Walls, Calculation of Earth Pressure on Retaining Walls, Design of Rigid Walls, Design of Ordinary R.C. cantilever Walls, Design of cantilever Walls without Toe, Design of Basement Walls, Calculation of Earth Pressures in Clays, Design of Free Standing Basement Walls.

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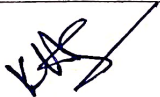
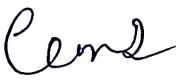
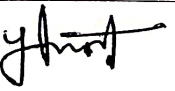
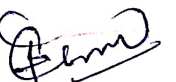
**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
ODALAREVU
DEPARTMENT OF CIVIL ENGINEERING**

TEXT BOOKS

1. Design of Reinforced Concrete Foundations – P. C. Varghese – PHI Learning Private Limited – 2009
2. Reinforced Concrete: Mechanics and Design – J. K. Wight & James K. MacGregor – Pearson Education – 6th Edition – 2011
3. Foundation Analysis and Design – Joseph E. Bowles – McGraw-Hill – 5th Edition – 2001 (Reprinted 2017)

Reference:

1. Design of Reinforced Concrete Structures – N. Subramanian – Oxford University Press – Illustrated – 2013
2. Reinforced Concrete Design – S. Unnikrishna Pillai & Devdas Menon – Tata McGraw Hill India – 4th Edition – 2021

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
					



**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

I Semester	25SE1D04	STRUCTURAL OPTIMIZATION	L	T	P	C
			3	0	0	3

Course Objectives:

1	Introduce the fundamental concepts of optimization, objective functions, design variables, and constraints.
2	Apply classical optimization techniques including calculus methods, Lagrange multipliers, and Kuhn–Tucker conditions.
3	Develop numerical techniques for unconstrained and constrained nonlinear programming problems.
4	Understand the theory and application of linear programming methods, including the simplex algorithm and duality concepts.
5	Provide knowledge on advanced optimization methods including quadratic, geometric, and dynamic programming with structural applications.

Course Outcomes: At the end of the course,

CO1	Formulate engineering optimization problems by identifying objective functions, variables, and constraints.
CO2	Solve optimization problems using classical methods such as Lagrange multipliers, Kuhn–Tucker conditions, and fully stressed design concepts.
CO3	Apply nonlinear programming techniques (Fibonacci, golden search, Powell's, Newton's, DFP, and penalty methods) for unconstrained and constrained problems.
CO4	Analyze and solve structural optimization problems using linear programming methods such as simplex, duality, and minimum weight design.
CO5	Use quadratic, geometric, and dynamic programming techniques for structural design problems such as beams and frames.

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Detailed Syllabus:

UNIT: 1

Introduction: Need and scope for optimization – statements of optimization problems- Objective function and its surface design variables- constraints and constraint surface- Classification of optimization problems (various functions continuous, discontinuous and discrete) and function behavior (monotonic and unimodal)

UNIT: 2

Classical optimization techniques: Differential calculus method, multi variable optimization by method of constrained variation and Lagrange multipliers (generalized problem) Khun-Tucker conditions of optimality -Fully stressed design and optimality criterion based algorithms- introduction, characteristics of fully stressed design theoretical basis-examples

UNIT: 3

Non-Linear programming: Unconstrained minimization- Fibonacci, golden search, Quadratic and cubic interpolation methods for a one dimensional minimization and univariate method, Powel's method, Newton's method and Davidon Fletcher Powell's method for multivariable optimization- Constrained minimization- Cutting plane method- Zoutendjik's method- penalty function methods.

UNIT: 4

Linear programming: Definitions and theorems- Simplex method-Duality in Linear programming- Plastic analysis and Minimum weight design and rigid frame.

UNIT: 5

Introduction to quadratic programming: Geometric programming- and dynamic programming- Design of beams and frames using dynamic programming technique.

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
ODALAREVU
DEPARTMENT OF CIVIL ENGINEERING**

TEXT BOOKS

1. Engineering Optimization: Theory and Practice – S. S. Rao – Wiley Eastern Limited, New Delhi – 4th Edition – 2009
2. Elements of Structural Optimization (Structural Optimization: Fundamentals and Applications) – Raphael T. Haftka & Zafer Gürdal – Springer, Dordrecht – 3rd Revised & Expanded Edition – 1992
3. Structural Optimization – N. S. Khot & L. Berke – ASCE Publications, New York – 1st Edition – 1973

REFERENCES

1. Optimization Concepts and Applications in Engineering – Ashok D. Belegundu & Tirupathi R. Chandrupatla – Cambridge University Press – 2nd Edition – 2019
2. Structural and Multidisciplinary Optimization – George I. N. Rozvany – Springer, Berlin – 1st Edition – 1998
3. Optimization Concepts and Applications in Engineering – Ashok D. Belegundu & Tirupathi R. Chandrupatla – Pearson Education, New Jersey – 1st Edition – 1999

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

I Semester	25SE1D05	BRIDGE ENGINEERING	L	T	P	C
			3	0	0	3

Course Objectives:

1	Introduce the design principles of masonry arch bridges, substructures, and abutments as per IRC standards.
2	Develop knowledge on slab bridges, wheel load distribution, and design methods for slabs and longitudinal girders.
3	Explain the structural behavior and design of plate girder bridges, including stiffeners and load transfer mechanisms.
4	Provide an understanding of prestressed concrete and composite bridges, including design checks for stresses, shear, and deflections.
5	Explain the analysis and design of substructures, abutments, piers, and pipe culverts with hydraulic and structural considerations.

Course Outcomes: At the end of the course,

CO1	Design masonry arch bridges including arch ring, abutments, piers, and connections as per IRC provisions.
CO2	Analyze wheel load effects and design slab bridges, T-beams, and longitudinal girders using various design methods.
CO3	Design plate girder bridges including webs, flanges, and stiffeners to resist applied loads.
CO4	Design prestressed concrete and composite bridges, accounting for prestressing forces, shear connectors, deflections, and serviceability checks.
CO5	Analyze and design substructures such as abutments, piers, and pipe culverts considering hydraulic flow and reinforcement requirements.

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Detailed Syllabus:

UNIT: 1

Masonry arch Bridge design details- Rise, radius, and thickness of arch- Arch ring- Dimensioning of sub structures- Abutments pier and end connections.(Ref: IRC- SP-13)

UNIT: 2

Super Structure: Slab bridge- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- Pigeaud's method- design of longitudinal girders- Guyon-Messonet method- Hendry Jaegar method- Courbon's theory. (Ref: IRC-21), voided slabs, T-Beam bridges.

UNIT: 3

Plate girder bridges- Elements of plate girder and their design-web-flange- intermediate stiffener- vertical stiffeners- bearing stiffener-design problem

UNIT: 4

Prestressed Concrete and Composite bridges- Preliminary dimensions-flexural and torsional parameters- Courbon's Theory – Distribution coefficients by exact analysis- design of girder section- maximum and minimum prestressing forces- eccentricity- live load and dead load shear forces- cable zone in girder- check for stresses at various sections- check for diagonal tension- diaphragms and end block design- short term and long term deflections- Composite action of composite bridges- shear connectors- composite or transformed section- design problem. (Ref: IRC: Section-VI)

UNIT: 5

Sub structure- Abutments- Stability analysis of abutments- piers- loads on piers – Analysis of piers- Design problem(Ref: IRC-13, IRC-21, IRC-78)- Pipe culvert- Flow pattern in pipe culverts- culvert alignment-culvert entrance structure- Hydraulic design and structural design of pipe culverts- reinforcements in pipes .(Ref: IRC: SP-13)

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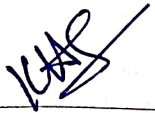
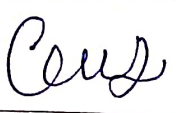
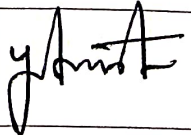
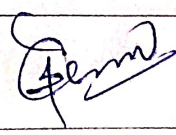
**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
ODALAREVU
DEPARTMENT OF CIVIL ENGINEERING**

TEXT BOOKS

1. Design of Concrete Bridges – M. G. Aswani, V. N. Vazirani & M. M. Ratwani – Khanna Publishers – 2nd Edition – 1995
2. Essentials of Bridge Engineering – D. Johnson Victor – Oxford & IBH Publishing – 6th Edition – 2019

REFERENCES

1. Design of Bridges – N. Krishna Raju – CBS Publishers & Distributors – 5th Edition – 2005
2. Bridge Engineering – S. Ponnuswamy – McGraw-Hill India – 3rd Edition – 2017

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

I Semester	25SE1D06	REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
			3	0	0	3

Course Objectives:

1	Introduce materials and admixtures used in repair and rehabilitation, and methods of non-destructive evaluation of concrete.
2	Explain strengthening and stabilization techniques for beams, columns, connections, and cracks.
3	Provide knowledge on bonded installation techniques using FRP, debonding mechanisms, and strengthening of structural floors.
4	Discuss fibre reinforced concrete, lightweight concrete, no-fines concrete, and flyash concretes with their mix design, properties, and applications.
5	Develop understanding of high-performance concretes and self-consolidating concretes with their materials, properties, and qualifications.

Course Outcomes: At the end of the course,

CO1	Identify materials, fibres, and wraps for repair and conduct non-destructive evaluation of deteriorated concrete structures.
CO2	Apply appropriate strengthening and stabilization techniques for beams, columns, connections, and crack repairs.
CO3	Use bonded FRP systems for structural strengthening and evaluate debonding mechanisms in practical applications.
CO4	Design and apply fibre reinforced, lightweight, no-fines, and flyash concretes in structural rehabilitation projects.
CO5	Evaluate the properties and applications of high-performance and self-consolidating concretes in modern construction.

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

Detailed Syllabus:

UNIT: 1

Materials for repair and rehabilitation -Admixtures- types of admixtures-purposes of using admixtures- chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Non destructive evaluation: Importance- Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT: 2

Strengthening and stabilization- Techniques- design considerations-Beam shear capacity strengthening- Shear Transfer strengthening-stress reduction techniques- Column strengthening- flexural strengthening- Connection stabilization and strengthening, Crack stabilization.

UNIT: 3

Bonded installation techniques- Externally bonded FRP- Wet layup sheet, bolted plate, near surface mounted FRP, fundamental debonding mechanisms-intermediate crack debonding- CDC debonding- plate end debonding- strengthening of floor of structures

UNIT: 4

Fibre reinforced concrete- Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Light weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Flyash concrete-Introduction- classification of flyash- properties and reaction mechanism of flyash- Properties of flyash concrete in fresh state and hardened state- Durability of flyash concretes

UNIT: 5

High performance concretes- Introduction- Development of high performance concretes- Materials of high performance concretes- Properties of high performance concretes- Self Consolidating concrete- properties- qualifications.

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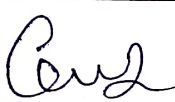
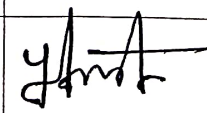
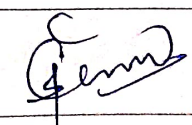
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TEXT BOOKS

1. Maintenance, Repair, Rehabilitation & Minor Works of Buildings – P. C. Varghese – PHI Learning (PHI Mediamatics) – 1st Edition – 2014
2. Repair and Rehabilitation of Concrete Structures – P. I. Modi & C. N. Patel – PHI Learning Pvt. Ltd. – Illustrated (First Edition) – 2015

REFERENCE:

1. Concrete Technology: Theory and Practice – M. S. Shetty & A. K. Jain – S. Chand Publishing – 8th Edition – 2019
2. Concrete Repair and Maintenance Illustrated: Problem Analysis; Repair Strategy; Techniques – Peter H. Emmons – John Wiley & Sons – Illustrated Edition – 1992
3. Handbook on Repair & Rehabilitation of R.C.C. Buildings – CPWD, Govt. of India – (Updated Reprint) – 2011

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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I Semester	25SE1D07	ADVANCED REINFORCED CONCRETE DESIGN	L	T	P	C
			3	0	0	3

Course Objectives:

1	Understand the behavior of reinforced concrete beams and slabs in terms of deflection and cracking, and apply IS 456 provisions.
2	Learn redistribution of moments in continuous beams and analyze grid floors using various methods.
3	Gain knowledge of flat slab design using different methods and reinforcement detailing.
4	Study the design of reinforced concrete chimneys under different loading and thermal conditions.
5	Analyze and design reinforced concrete members for fire resistance as per codal provisions.

Course Outcomes: At the end of the course,

CO1	Evaluate short-term deflections and crack widths of beams and slabs using IS 456 methods.
CO2	Apply the concept of moment redistribution in beams and analyze grid floors using stiffness and approximate methods.
CO3	Design flat slabs using direct design and equivalent frame methods with proper detailing.
CO4	Design reinforced concrete chimneys considering self-weight, wind, and temperature stresses.
CO5	Assess fire resistance of reinforced concrete members and design beams and slabs for elevated temperature effects.

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Detailed Syllabus:

UNIT: 1

Deflection of Reinforced Concrete Beams and Slabs: Introduction, Short-term deflection of beams and slabs, Deflection due to imposed loads, Short-term deflection of beams due to applied loads, Calculation of deflection by IS 456, Deflection of continuous beams by IS 456, Deflection of slabs. Estimation of Crack width in Reinforced Concrete Members: Introduction, Factors affecting crack width in beams, Mechanisms of flexural cracking, Calculation of crack width, Simple empirical method, Estimation of crack width in beams by IS 456, Shrinkage and thermal cracking.

UNIT: 2

Redistribution of Moments in Reinforced Concrete Beams: Introduction, Redistribution of moments in fixed beam, Positions of points of contraflexures, Conditions for moment redistribution, Final shape of redistributed bending moment diagram, Moment redistribution for a two-span continuous beam, Advantages and disadvantages of moment redistribution, Modification of clear distance between bars in beams (for limiting crack width) with redistribution, Moment- curvature ($M - \psi$), Relation of reinforced concrete sections.

Approximation Analysis of Grid Floors: Introduction, Analysis of flat grid floors, Analysis of rectangular grid floors by Timoshenko's plate theory. Analysis of grid by stiffness matrix method, Analysis of grid floors by equating joint deflections, Comparison of methods of analysis, Detailing of steel in flat grids.

UNIT: 3

Design of Flat Slabs: Introduction, Proportioning of Flat Slabs, Determination of Bending moment and Shear Force, Direct Design method, Equivalent Frame method, Slab Reinforcement.

UNIT: 4

Chimneys : Introduction, Design factors, Stresses due to Self Weight and Wind load, Stress in horizontal reinforcement, Temperature Stresses, Combined effect of Self Weight, Wind load and Temperature, Temperature stresses in Hoop(Horizontal) Reinforcement.

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UNIT: 5

Design of Reinforced Concrete Members for Fire Resistance: Introduction, ISO 834 standard heating conditions, Grading or classifications, Effect of high temperature on steel and concrete, Effect of high temperatures on different types of structural members, Fire resistance by structural detailing from tabulated data, Analytical determination of the ultimate bending moment, Capacity of reinforced concrete beams under fire, Other considerations.

TEXT BOOKS

1. Advanced Reinforced Concrete Design – P. C. Varghese – Prentice Hall of India Pvt. Ltd. – 2nd Edition – 2008
2. Reinforced Concrete Design – S. Unnikrishna Pillai & Devdas Menon – Tata McGraw Hill Education, New Delhi – 4th Edition – 2021
3. Design of Reinforced Concrete Structures – N. Subramanian – Oxford University Press, New Delhi – Illustrated (Reprint) – 2013

REFERENCES:

1. Design of Reinforced Concrete Structures – N. Subramanian – Oxford University Press, New Delhi – Illustrated Reprint – 2013
2. Advanced Reinforced Concrete Design – N. Krishna Raju – CBS Publishers & Distributors – 2nd Edition – 2010

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

I Semester	25SE1D08	FRACTURE MECHANICS	L	T	P	C
			3	0	0	3

Course Objectives:

1	Understand the fundamentals of elastic and plastic behavior, fracture modes, energy release rates, and crack propagation.
2	Learn the principles of linear elastic fracture mechanics and the role of stress intensity factors in component design.
3	Study mixed mode crack propagation and material characterization methods like CTOD and CMOD.
4	Explore fatigue crack growth, Paris law, and retardation effects under cyclic loading.
5	Apply fracture mechanics principles to concrete structures and understand size effect laws.

Course Outcomes: At the end of the course,

CO1	Explain fracture mechanisms, stress concentration, energy release rates, and R-curve behavior.
CO2	Apply linear elastic fracture mechanics concepts, calculate stress intensity factors, and evaluate critical crack lengths.
CO3	Predict mixed mode crack propagation and characterize materials using CTOD and CMOD parameters.
CO4	Analyze fatigue crack growth using Paris law and identify factors affecting crack retardation.
CO5	Apply fracture mechanics to concrete, interpret strain softening, and use Bazant's size effect law in structural design.

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Detailed Syllabus:

UNIT: 1

Introduction: Fundamentals of elastic and plastic behaviour of materials- stresses in a plate with a hole – Stress Concentration factor-modes of failure- Brittle fracture and ductile fracture- history of fracture mechanics-Griffiths criteria for crack propagation cracks- Energy release rate, G_I G_{II} and G_{III} - Critical energy release rate G_{Ic} , G_{IIc} and G_{IIIc} – surface energy - R curves – compliance.

UNIT: 2

Principles of Linear Elastic Fracture Mechanics: SOM vs Fracture Mechanics -stressed based Criteria for fracture- Stress Intensity Factors- K_I K_{II} and K_{III} – Critical stress Intensity Factors, K_{Ic} K_{IIc} and K_{IIIc} – crack tip plastic zone – Erwin's plastic zone correction –Critical crack length-Load carrying capacity of a cracked component- Design of components based on fracture mechanics.

UNIT: 3

Mixed mode crack propagation- Maximum tangential stress criterion – crack propagation angle - Material characterisation by Crack Tip Opening Displacements (CTOD)- Crack Mouth Opening Displacement (CMOD)- Critical crack tip opening displacement (CTOD_c) –critical Crack Mouth Opening Displacement (CMOD_c).

UNIT: 4

Fatigue Crack propagation- Fatigue load parameters Fatigue crack growth curve –Threshold stress intensity factor-Paris law- Retardation effects.

UNIT: 5

Applications of fracture Mechanics to concrete- reasons –strain softening behaviour – Bazant's size effect law.

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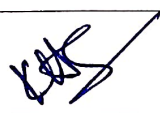
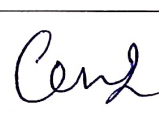
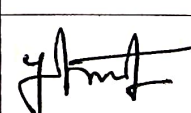
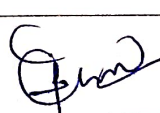
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DEPARTMENT OF CIVIL ENGINEERING**

TEXT BOOKS

1. Elementary Engineering Fracture Mechanics – David Broek – Sijthoff & Noordhoff International Publishers – Alphen aan den Rijn, Netherlands – 1978
2. Elements of Fracture Mechanics – Prashant Kumar – Wiley Eastern Limited – New Delhi – 1989

REFERENCES

1. Fracture Mechanics: Fundamentals and Applications – T.L. Anderson – CRC Press – 4th Edition – 2017
2. Fracture Mechanics of Concrete: Applications of Fracture Mechanics to Concrete, Rock, and Other Quasi-Brittle Materials – Surendra P. Shah, Stuart E. Swartz & Chengsheng Ouyang – John Wiley & Sons – 1995

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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I Semester	25SE1L01	ADVANCED CONCRETE TECHNOLOGY LABORATORY	L	T	P	C
			0	1	2	2

Course Objectives:

1	To understand the influence of water–cement ratio on the workability and strength of different concretes.
2	To study the effect of coarse aggregate to fine aggregate variation on fresh and hardened properties of concrete.
3	To familiarize students with the principles and applications of electrical resistance strain gauges for strain measurement.
4	To provide knowledge on non-destructive testing (NDT) techniques such as Rebound Hammer and Ultrasonic Pulse Velocity (UPV) tests.
5	To introduce the qualifications and testing methods for Self-Compacting Concrete (SCC) using L-Box, J-Box, U-Box, and Slump tests.

Course Outcomes: At the end of the course,

CO1	Analyze the relationship between water–cement ratio and workability and strength of concrete mixes.
CO2	Assess the influence of aggregate proportions (coarse to fine) on both workability and strength of concrete.
CO3	Apply electrical resistance strain gauges for accurate strain measurement in experimental studies
CO4	Perform non-destructive tests such as Rebound Hammer and UPV to assess in-situ quality of concrete.
CO5	Conduct qualification tests on Self-Compacting Concrete using standard test methods (L-Box, J-Box, U-Box, Slump flow) and interpret results effectively

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Detailed Syllabus:

List of Experiments:

1. Study on Water / Cement Ratios Vs Workability of different concretes
2. Study on Water / Cement Ratios Vs Strength of different concretes
3. Study of variation of Coarse Aggregate to Fine Aggregates on Workability
4. Study of variation of Coarse Aggregate to Fine Aggregates on Strength
5. Strain measurement - Electrical resistance strain gauges
6. Non destructive testing- Impact Hammer test, UPV test
7. Qualifications tests on Self compaction concrete- L Box , J Box , U box and Slump tests

NOTE: A minimum of five experiments from the above set have to be conducted

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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I Semester	25SE1L02	ADVANCED STRUCTURAL ENGINEERING LABORATORY	L	T	P	C
			0	1	2	2

Course Objectives:

1	To study the behavior of under-reinforced, over-reinforced, and balanced RCC sections in terms of deflection and cracking.
2	To understand the flexural and shear behavior of RCC beams under different loading and design conditions.
3	To analyze the structural performance of one-way and two-way RCC slabs with various support conditions.
4	To determine the material property of concrete by calculating Young's Modulus of Elasticity.
5	To gain practical exposure to in-situ concrete testing through core extraction and evaluation.

Course Outcomes: At the end of the course,

CO1	Differentiate between the behavior of under-reinforced, over-reinforced, and balanced RCC sections based on deflection and cracking.
CO2	Conduct experimental studies on RCC beams to evaluate flexural and shear failures.
CO3	Analyze the load-deflection and crack patterns of one-way and two-way slabs under different edge conditions.
CO4	Determine Young's Modulus of Elasticity of concrete experimentally and compare with theoretical values.
CO5	Perform concrete core extraction from pavements and assess in-situ quality and strength of concrete.

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Detailed Syllabus:

List of Experiments:

1. Study on Deflection and Cracks on a Under Reinforced Over Reinforced and Balanced Sections
2. Study on Performance of RCC Beams designed for Bending and failing in Shear
3. Study on Performance of RCC Beams designed for Shear and failing in Bending
4. Study on Performance of RCC One way slabs
5. Study on Performance of RCC Two way slabs with simply supported edge conditions
6. Study on Performance of RCC Two way slabs with fixed edge conditions
7. Calculation of Young's Modulus of Elasticity of Concrete
8. Extraction and Study of Concrete Core samples from pavements

NOTE: A minimum of five experiments from the above set have to be conducted as demonstration to entire class.

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I Semester	Seminar -I	L	T	P	C
25SE1S01		0	0	2	1

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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II Semester	FINITE ELEMENT METHODS IN STRUCTURAL ENGINEERING	L	T	P	C
25SE2T04		3	1	0	4

Course Objectives:

1	To introduce the fundamentals of energy principles, variational methods, and weighted residual approaches for structural analysis.
2	To develop finite element formulations for truss structures and understand stress analysis under different support conditions.
3	To understand the finite element modeling of beam and frame elements subjected to various loadings using stiffness formulations.
4	To study finite element formulations for plane stress, plane strain, and axisymmetric problems using CST and LST elements.
5	To learn iso-parametric formulations, numerical integration, and stability considerations for accurate finite element analysis.

Course Outcomes: At the end of the course, the student will be able to

CO1	Apply the principles of energy methods and variational approaches to formulate approximate solutions for structural problems.
CO2	Develop and analyze finite element formulations for truss structures, including stress computation and support conditions.
CO3	Formulate and solve finite element models of beam and frame elements subjected to various loadings and support conditions.
CO4	Model and analyze plane stress, plane strain, and axisymmetric problems using CST and LST elements with convergence verification.
CO5	Implement iso-parametric formulations with appropriate shape functions and numerical integration to ensure accurate stress computation and stability of finite element models.

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Detailed Syllabus:

UNIT: 1

Introduction: Review of stiffness method- Principle of Stationary potential energy-Potential energy of an elastic body- Rayleigh-Ritz method of functional approximation - variational approaches - weighted residual methods

UNIT: 2

Finite Element formulation of truss element: Stiffness matrix- properties of stiffness matrix – Selection of approximate displacement functions- solution of a plane truss- transformation matrix and stiffness matrix for a 3-D truss- Inclined and skewed supports- Galerkin's method for 1-D truss – Computation of stress in a truss element.

UNIT: 3

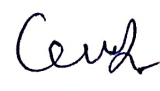
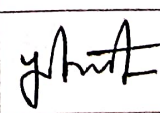
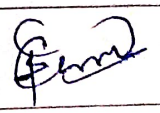
Finite element formulation of Beam elements: Beam stiffness- assemblage of beam stiffness matrix- Examples of beam analysis for concentrated and distributed loading- Galerkin's method - 2-D Arbitrarily oriented beam element – inclined and skewed supports –rigid plane frame examples

UNIT: 4

Finite element formulation for plane stress, plane strain and axi-symmetric problems- Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces-Finite Element solution for plane stress and axi-symmetric problems- comparison of CST and LST elements – convergence of solution- interpretation of stresses.

UNIT: 5

Iso-parametric Formulation: Iso-parametric bar element- plane bilinear Iso-parametric element – quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature- appropriate order of quadrature – element and mesh instabilities – spurious zero energy modes, stress computation- patch test.

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
ODALAREVU
DEPARTMENT OF CIVIL ENGINEERING**

TEXT BOOKS

1. A First Course in the Finite Element Method – Daryl L. Logan – Thomson Publications – 4th Edition – 2007.
2. Concepts and Applications of Finite Element Analysis – Robert D. Cook & Michael E. Plesha – John Wiley & Sons – 4th Edition – 2001.

REFERENCES

1. Introduction to Finite Elements in Engineering – Tirupati R. Chandrupatla & Ashok D. Belegundu – PHI Learning – 4th Edition – 2012.
2. Finite Element Methods (For Structural Engineers) – Wail N. Rifaie & Ashok K. Govil – New Age International Publishers – 1st Edition – 2010.

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

II Semester	EARTHQUAKE RESISTANT DESIGN	L	T	P	C
25SE2T05		3	1	0	4

Course Objectives:

1	To provide fundamental knowledge of engineering seismology, seismic waves, tectonics, and Indian seismicity.
2	To understand seismic design concepts, architectural considerations, and provisions of IS codes for earthquake-resistant buildings.
3	To study the calculation of earthquake loads, 3D modeling, and ductile detailing of structural elements.
4	To explore cyclic loading behavior of structural elements and modern earthquake-resistant techniques.
5	To impart knowledge on retrofitting and restoration techniques for earthquake-damaged buildings.

Course Outcomes: At the end of the course,

CO1	Students will be able to analyze earthquake characteristics, seismic zones, and vibration effects on structures.
CO2	Students will be able to apply code-based seismic design principles to evaluate structural systems like frames, shear walls, and braced frames.
CO3	Students will be able to design and detail beams, columns, and shear walls considering ductility and strong-column weak-beam concepts.
CO4	Students will be able to assess structural performance under cyclic loads and evaluate systems like base isolation and adaptive devices.
CO5	Students will be able to identify damage factors and implement suitable retrofitting and restoration methods for seismic safety.

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Detailed Syllabus:

UNIT: 1

Engineering seismology – rebound theory – plate tectonics – seismic waves - earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects

UNIT: 2

Seismic design concepts – EQ¹ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames(MRF) – ductility of MRF – Infill wall – Non- structural elements

UNIT: 3

Calculation of EQ load – 3D modeling of building systems and analysis (theory only) Design and ductile detailing of Beams and columns of frames Concept of strong column weak beams, Design and ductile detailing of shear walls

UNIT: 4

Cyclic loading behavior of RC, steel and pre- stressed concrete elements - modern concepts- Base isolation – Adaptive systems – case studies

UNIT: 5

Retrofitting and restoration of buildings subjected to damage due to earthquakes- effects of earthquakes – factors related to building damages due to earthquake- methods of seismic retrofitting- restoration of buildings

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
ODALAREVU
DEPARTMENT OF CIVIL ENGINEERING**

TEXT BOOKS

1. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Prentice Hall of India – 1st Edition – 2007
2. Earthquake Resistant Design of Structures – S.K. Duggal – Oxford University Press – 2nd Edition – 2013

REFERENCE

1. Introduction to the Theory of Seismology – K.E. Bullen – Cambridge University Press – Reprint Edition – 1996.
2. Earthquake Resistant Design and Risk Reduction – David J. Dowrick – Wiley Publications – 2nd Edition – 2009
3. IS 4326 -1998: Earthquake Resistant Design and Construction of Buildings
4. IS 1893 (Part 1 to 5)- 2002: General Provisions and Building
5. IS 4928-1993: Code of practice for Earthquake Resistant Design and Construction of Buildings
6. IS 13920-1997: Code of Practice for Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces
7. IS 13935-1993: Guidelines for Repair and Seismic Strengthening of Building

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

II Semester	STABILITY OF STRUCTURES	L	T	P	C
25SE2T06		3	1	0	4

Course Objectives:

1	To introduce the behavior of beam-columns under combined axial and lateral loads using differential equations and analytical methods.
2	To study the elastic buckling behavior of columns under different loading, boundary, and support conditions.
3	To understand inelastic buckling, experimental approaches, and mathematical methods for column stability.
4	To explain torsional effects and buckling in thin-walled open-section members.
5	To study the phenomenon of lateral buckling in beams subjected to pure bending

Course Outcomes: At the end of the course,

CO1	Students will be able to analyze beam-columns under various loading and support conditions and determine allowable stresses.
CO2	Students will be able to evaluate critical loads and stability of columns, frames, and built-up members using energy methods and elastic theory.
CO3	Students will be able to apply tangent modulus and double modulus theories, interpret experimental data, and use Ritz and stiffness methods for stability analysis.
CO4	Students will be able to analyze torsional buckling and combined torsion-flexure problems in structural members.
CO5	Students will be able to evaluate lateral buckling strength of rectangular and I-section beams under bending.

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DEPARTMENT OF CIVIL ENGINEERING**

Detailed Syllabus:

UNIT: 1

Beam columns: Differential equation for beam columns – Beams column with concentrated loads – continuous lateral load – couples – Beam column with built in ends – continuous beams with axial load – application of Trigonometric series – Determination of allowable stresses

UNIT: 2

Elastic buckling of bars : Elastic buckling of straight columns – Effect of shear stress on buckling – Eccentrically and laterally loaded columns – Sway & Non Sway mode - Energy methods – Buckling of a bar on elastic foundation – Buckling of bar with intermediate compressive forces and distributed axial loads – Buckling of bars with change in cross section – Effect of shear force on critical load – Built up columns – Effect of Initial curvature on bars – Buckling of frames – Sway & Non Sway mode

UNIT: 3

In-elastic buckling: Buckling of straight bars – Double modulus theory Tangent modulus theory. Experiments and design formulae: Experiments on columns – Critical stress diagram – Empirical formulae of design – various end conditions – Design of columns based on buckling. Mathematical Treatment of stability problems: Buckling problem orthogonality relation – Ritz method – Stiffness method and formulation of Geometric stiffness matrix- Applications to simple frames

UNIT: 4

Torsional Buckling: Pure torsion of thin walled bars of open cross section – Non uniform torsion of thin walled bars of open cross section - Torsional buckling – Buckling of Torsion and Flexure

UNIT: 5

Lateral Buckling of simply supported Beams: Beams of rectangular cross section subjected for pure bending, Buckling of I Section subjected to pure bending

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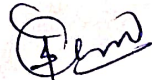
**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
ODALAREVU
DEPARTMENT OF CIVIL ENGINEERING**

TEXT BOOKS

1. Theory of Stability of Structures – Alexander Chajes – Dover Publications – Reprint Edition – 1993
2. Theory of Elastic Stability – Stephen P. Timoshenko & J.M. Gere – McGraw Hill Education – 2nd Edition – 2017 (Reprint)

REFERENCES:

1. Fundamentals of Structural Stability – George J. Simitses & Dewey H. Hodges – Elsevier Publications – 1st Edition – 2006
2. Elastic Stability of Structural Elements – N.G.R. Iyengar – Macmillan India Ltd. – 1st Edition – 1988

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

II Semester	ANALYSIS OF TALL STRUCTURES	L	T	P	C
25SE2D09		3	0	0	3

Course Objectives:

1	To introduce modern materials and design philosophies relevant to advanced concrete technologies.
2	To study different types of structural loadings including gravity, wind, and earthquake effects.
3	To understand the behavior and structural forms of different high-rise structural systems.
4	To develop skills in structural analysis and design using approximate and advanced computational methods.
5	To study the stability of high-rise structures under various loading and geometric effects

Course Outcomes: At the end of the course,

CO1	Students will be able to select and apply high-performance concretes such as fibre-reinforced, lightweight, and self-compacting concrete in structural design.
CO2	Students will be able to compute and combine gravity, wind, and seismic loads using analytical and experimental methods as per design standards.
CO3	Students will be able to evaluate the performance of braced frames, shear walls, tubular, outrigger, and hybrid structural systems.
CO4	Students will be able to analyze 3D structures considering member forces, deformations, and effects of creep, shrinkage, temperature, and fire.
CO5	Students will be able to perform stability analysis considering P-Delta effects, buckling, torsional instability, and foundation flexibility.

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DEPARTMENT OF CIVIL ENGINEERING**

Detailed Syllabus:

UNIT: 1

Design Criteria Philosophy, Materials – Modern concepts – High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete.

UNIT: 2

Gravity Loading – Dead load, Live load, Impact load, Construction load, Sequential loading. Wind Loading – Static and Dynamic Approach, Analytical method, Wind Tunnel Experimental methods. Earthquake Loading – Equivalent lateral Load analysis, Response Spectrum Method, Combination of Loads.

UNIT: 3

Behavior of Structural Systems- Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, In-filled frames, Shear walls, Coupled Shear walls, Wall-Frames, Tubular, Outrigger braced, Hybrid systems

UNIT: 4

Analysis and Design- Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of structures as an integral UNIT, Analysis for member forces, drift and twist. Computerized 3D analysis. Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

UNIT: 5

Stability Analysis- Overall buckling analysis of frames, wall-frames, Approximate methods, Second order effect of gravity loading, P-Delta Effects, Simultaneous first order and P-Delta analysis, Translational instability, Torsional Instability, Out of plumb effects, Effect of stiffness of members and foundation rotation in stability of structures.

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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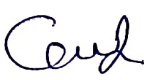
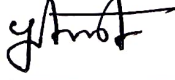
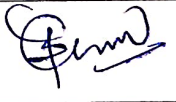
**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
ODALAREVU
DEPARTMENT OF CIVIL ENGINEERING**

TEXT BOOKS

1. Tall Building Structures: Analysis and Design – Bryan Stafford Smith & Alex Coull – John Wiley & Sons Inc. – 1st Edition – 1991
2. Structural Design of Multistoried Buildings – U.H. Varyani – South Asian Publishers – Revised Edition – 2002

REFERENCE:

1. Structural Analysis and Design of Tall Buildings – Bungale S. Taranath – McGraw Hill – 1st Edition – 1988
2. High-Rise Building Structures – Wolfgang Schueller – John Wiley & Sons Inc. – 1st Edition – 1977
3. The Art of the Skyscraper: The Genius of Fazlur R. Khan – Ali Mir – Rizzoli International Publications – 1st Edition – 2001

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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II Semester	ADVANCED STEEL DESIGN	L	T	P	C
25SE2D10		3	0	0	3

Course Objectives:

1	To introduce different types of riveted, bolted, and welded connections along with their design principles and failure modes.
2	To study the fundamentals of plastic analysis and methods to evaluate collapse loads in structural members and frames.
3	To understand the behavior and design of eccentric and moment-resistant connections in steel structures.
4	To develop the ability to analyze and design industrial building components subjected to various loading conditions.
5	To study the design principles of steel truss girder bridges and their component members under different loads.

Course Outcomes: At the end of the course,

CO1	Students will be able to design efficient bolted and welded connections considering load transfer, strength, slip, and prying action.
CO2	Students will be able to analyze beams and frames using plastic theory and determine their ultimate load-carrying capacity.
CO3	Students will be able to design bolted and welded connections subjected to eccentric shear and moment for beam-column junctions.
CO4	Students will be able to design roof trusses, purlins, bracings, and stanchions for industrial structures under dead, live, and wind loads.
CO5	Students will be able to design truss bridges including compression members, tension members, and bracing systems considering wind effects.

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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Detailed Syllabus:

UNIT-I

Simple Connections – Riveted, Bolted Pinned And Welded Connections: Riveted Connections – Bolted Connections – Load Transfer Mechanism – Failure of Bolted Joints – Specifications for Bolted Joints – Bearing – Type Connections – Tensile Strength of Plate – Strength and Efficiency of the Joint – Combined Shear and Tension – Slip-Critical connections – Prying Action – Combined Shear and Tension for Slip-Critical Connections. Design of Groove Welds - Design of Fillet Welds – Design of Intermittent Fillet Welds – Failure of Welds.

UNIT-II

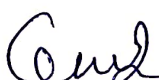
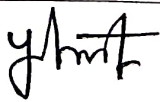
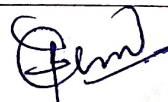
Plastic Analysis: Introduction – Plastic Theory – Plastic neutral Axis plastic moment, Elastic & Plastic Section moduli - shape factors plastic Hinge – Fundamental condition conditions in plastic analysis, methods of plastic analysis – collapse load – simply supported, propped cantilever beam, fixed beams continuous beams, portal frame single bay single storey portal frame at different level subjected to vertical and horizontal loads.

UNIT-III

Eccentric And Moment Connections: Introduction – Beams – Column Connections – Connections Subjected to Eccentric Shear – Bolted Framed Connections – Bolted Seat Connections – Bolted Bracket Connections. Bolted Moment Connections – Welded Framed Connections- Welded Bracket Connections – Moment Resistant Connections.

UNIT-IV

Analysis And Design Of Industrial Buildings: Dead loads, live loads and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs; wind effect on cladding and louvers; Design of angular roof truss, tubular truss, truss for a railway platform. Design of purlins for roofs, design of built up purlins, design of knee braced trusses and stanchions. Design of bracings.

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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UNIT-V

Design Of Steel Truss Girder Bridges: Types of truss bridges, component parts of a truss bridge, economic Proportions of trusses, self weight of truss girders, design of bridge Compression members, tension members; wind load on truss girder Bridges; wind effect on top lateral bracing; bottom lateral bracing; portal Bracing; sway bracing Design of Lacing.

TEXT BOOKS

1. Limit State Design of Steel Structures – S.K. Duggal – McGraw Hill Education Pvt. Ltd. – New Delhi – 3rd Edition – 2017
2. Design of Steel Structures – N. Subramanian – Oxford University Press – New Delhi – 2nd Edition – 2011
3. Design of Steel Structures, Volume II – Ramchandra & Virendra Gehlot – Scientific Publishers (India) – Journals Department – Revised Edition – 2009

REFERENCE

1. Design of Steel Structures – P. Dayaratnam – S. Chand Publishing – New Delhi – Reprint Edition – 2011–2012
2. Design of Steel Structures – Edwin H. Gaylord, Charles N. Gaylord & James E. Stallmeyer – Tata McGraw Hill Education – New Delhi – 2nd Edition – 2012
3. Indian Standard Code – IS – 800-2007.
4. Indian Standard Code – IS – 875 – Part III – 2015

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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II Semester	ANALYSYS OF OFFSHORE STRUCTURES	L	T	P	C
25SE2D11		3	0	0	3

Course Objectives:

1	To introduce types of offshore structures and the principles of hydrostatics governing their stability and motion.
2	To study fluid flow principles and wave theories relevant to offshore engineering.
3	To understand methods for estimating wave and current forces on small offshore bodies.
4	To explore theories of wave forces acting on large offshore structures.
5	To introduce the static and dynamic analysis methods of fixed offshore structures.

Course Outcomes: At the end of the course,

CO1	Students will be able to analyze the stability and motions of fixed, compliant, and floating offshore structures using hydrostatic principles.
CO2	Students will be able to apply Bernoulli's equation and Airy's linear wave theory to evaluate wave characteristics, kinematics, and energy.
CO3	Students will be able to compute hydrodynamic forces on vertical cylinders using Morison's equation considering marine growth effects.
CO4	Students will be able to estimate wave forces on large bodies using Froude-Krylov and diffraction theories.
CO5	Students will be able to perform structural analysis of fixed offshore platforms under hydrodynamic loading.

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Detailed Syllabus:

UNIT: 1

Introduction to different types of offshore structures, Concept of fixed, compliant and floating structures, Law of floatation, fluid pressure and centre of pressure, estimation of centre of gravity, hydrostatic particulars, stability criteria of floating bodies, and motions of a floating body.

UNIT: 2

Conservation mass and momentum, Euler equation, Bernoulli's Equation, Potential flow, Classification of waves, small amplitude or Linear Airy's theory, dispersion relationship, water particle kinematics, wave energy.

UNIT: 3

Wave force estimation- Wave force on small bodies-Morison equation, Estimation of wave force on a vertical cylinder, Force due to current, Effect of marine growth on vertical cylinders.

UNIT: 4

Wave force on large bodies-Froude-Krylov theory, Diffraction theory.

UNIT: 5

Static and dynamic analysis of fixed offshore structures.

TEXT BOOKS

1. Introduction to Offshore Structures – W. J. Graff – Gulf Publishing Company – Houston – 1st Edition – 1981
2. Offshore Structural Engineering – T. H. Dawson – Prentice Hall – New Jersey – 1st Edition – 1983

REFERENCES

1. Handbook of Offshore Engineering, Vol. I – Subrata Chakrabarti – Offshore Structure Analysis Inc. – Plainfield, Illinois – 1st Edition – 2005
2. API RP 2A: Planning, Designing and Constructing Fixed Offshore Platforms – American Petroleum Institute (API) – Washington D.C. – 21st Edition – 2000
3. Planning and Design of Fixed Offshore Platforms – B. McClelland & M. D. Reifel – Van Nostrand Reinhold – New York – 1st Edition – 1986

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

II Semester	STRUCTURAL HEALTH MONITORING	L	T	P	C
25SE2D12		3	0	0	3

Course Objectives:

1	To introduce factors affecting structural health, causes of distress, and the importance of regular maintenance.
2	To study structural health monitoring concepts, safety in alterations, and structural audit procedures.
3	To understand static field testing methods, loading techniques, and sensor requirements.
4	To explore dynamic field testing methods and remote health monitoring techniques.
5	To introduce repair and rehabilitation techniques along with smart materials and EMI-based monitoring methods.

Course Outcomes: At the end of the course,

CO1	Students will be able to identify structural distress causes and propose preventive maintenance strategies.
CO2	Students will be able to assess structural health, conduct audits, and outline SHM procedures for safety evaluation.
CO3	Students will be able to conduct static field tests and interpret structural responses using appropriate instrumentation.
CO4	Students will be able to perform dynamic response measurements and apply remote SHM systems for structural evaluation.
CO5	Students will be able to suggest suitable repair/rehabilitation measures and apply smart material-based techniques like EMI for SHM.

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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UNIT-I

Structural Health: Factors affecting Health of Structures, Causes of Distress, Regular Maintenance

UNIT-II

Structural Health Monitoring: Concept, Various Measures, Structural Safety in Alteration. **Structural Audit:** Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHM Procedures

UNIT – III

Static Field Testing: Types of Static Tests, Simulation and Loading Methods, sensor systems and hardware requirements, Static Response Measurement.

UNIT-IV

Dynamic Field Testing: Types of Dynamic Field Test, Stress History Data, Dynamic Response Methods, Hardware for Remote Data Acquisition Systems, Remote Structural Health Monitoring.

UNIT-V

Introduction to Repairs and Rehabilitations of Structures: Case Studies (Site Visits), Piezo– electric materials and other smart materials, electro–mechanical impedance (EMI) technique, adaptations of EMI technique.

TEXT BOOKS

1. Structural Health Monitoring – Daniel Balageas, Claus Peter Fritzen & Alfredo Güemes – John Wiley & Sons – Chichester – 1st Edition – 2006
2. Health Monitoring of Structural Materials and Components: Methods with Applications – Douglas E. Adams – John Wiley & Sons – Chichester – 1st Edition – 2007

REFERENCES

1. Structural Health Monitoring and Intelligent Infrastructure, Vol. 1 – J. P. Ou, H. Li & Z. D. Duan – Taylor & Francis Group – London – 1st Edition – 2006
2. Structural Health Monitoring with Wafer Active Sensors – Victor Giurgiutiu – Academic Press Inc. – Burlington – 1st Edition – 2007

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

II Semester	THEORY OF PLATES AND SHELLS	L	T	P	C
25SE2D13		3	0	0	3

Course Objectives:

1	To understand plate theory and derive governing differential equations for plates under different loading conditions.
2	To study the behavior of circular and annular plates under symmetrical loading.
3	To introduce the concepts of shells, equilibrium equations, and membrane/bending theories.
4	To learn cylindrical shell theories including DKJ and Schorer's approaches.
5	To apply beam theory for cylindrical shells and study special shell geometries.

Course Outcomes: At the end of the course,

CO1	Students will be able to analyze rectangular plates using Navier's and Levy's solutions for various boundary conditions.
CO2	Students will be able to evaluate stresses and deflections in circular and annular plates for different loads.
CO3	Students will be able to derive stress resultants and apply shell theories for structural analysis.
CO4	Students will be able to design short and long cylindrical shells using analytical methods and ASCE coefficients.
CO5	Students will be able to analyze diaphragms and design paraboloid and conoidal shells using membrane theory.

Detailed Syllabus:

UNIT: 1

Derivation of governing differential equation for plate- in plane bending and transverse bending effects- Rectangular plates: Plates under various loading conditions like concentrated, uniformly distributed load and hydrostatic pressure. Navier and Levy's type of solutions for various boundary condition.

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UNIT: 2

Circular plates: Symmetrically loaded, circular plates under various loading conditions, Annular plates.

UNIT: 3

Introduction to Shells- Single and double curvature- Equations of Equilibrium of Shells: Derivation of stress resultants, Principles of membrane theory and bending theory

UNIT: 4

Cylindrical Shells: Derivation of the governing DKJ equation for bending theory, details of Schorer's theory. Application to the analysis and design of short and long shells. Use of ASCE Manual coefficients for the design.

UNIT: 5

Beam theory of cylindrical shells: Beam and arch action. Design of diaphragms - Geometry analysis and design of elliptic Paraboloid, Conoidal and Hyperbolic Paraboloid shapes by membrane theory.

TEXT BOOKS

1. Theory of Plates and Shells (2nd Edition) – S. Timoshenko & S. Woinowsky-Krieger – McGraw-Hill Book Company Inc. – New York – 1959
2. Reinforced Concrete Shells and Folded Plates – P. C. Varghese – Prentice Hall of India – New Delhi – 1st Edition – 1996
3. Analysis of Thin Concrete Shells – K. Chandrasekhar – New Age International (P) Ltd. – New Delhi – 1st Edition – 2010

REFERENCES:

1. Theory and Analysis of Elastic Plates and Shells – J. N. Reddy – CRC Press – Boca Raton – 1st Edition – 2006
2. A Textbook of Shell Analysis – K. Bairagi – Khanna Publishers – New Delhi – 1st Edition – 1990
3. Design and Construction of Concrete Shell Roofs – G. S. Ramaswamy – McGraw-Hill – New York – 1968

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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II Semester	PRECAST AND REFABRICATED STRUCTURES	L	T	P	C
25SE2D14		3	0	0	3

Course Objectives:

1	To understand the principles, types, and economy of prefabrication along with modular coordination.
2	To study the design and behavior of prefabricated load-carrying members.
3	To learn different types of joints and their functional requirements in precast structures.
4	To understand production and hoisting technologies in prefabricated construction.
5	To explore the applications of precast systems and safety provisions against abnormal loads.

Course Outcomes: At the end of the course,

CO1	Students will be able to compare prefabrication with monolithic construction and identify suitable materials and systems.
CO2	Students will be able to analyze beams, columns, panels, and frames used in large panel construction.
CO3	Students will be able to design structural and expansion joints ensuring strength, sealing, and durability.
CO4	Students will be able to plan production setups and apply erection techniques for different precast elements.
CO5	Students will be able to design precast building components and ensure resistance to progressive collapse as per codes.

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Detailed Syllabus:

UNIT -I

Need for prefabrication – General Principles of Prefabrication - Comparison with monolithic construction, types of prefabrication, site and plant prefabrication, economy of prefabrication, modular coordination, standardization – Materials – Modular coordination – Systems – Production – Transportation – Erection.

UNIT -II

Prefabricated Load Carrying Members-Planning for components of prefabricated structures, disuniting of structures, design of simple rectangular beams and I-beams, handling and erection stresses, elimination of erection stresses, beams, columns, symmetric frames. Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls.

UNIT -III

Joints - Joints for different structural connections, effective sealing of joints for water proofing, provisions for non-structural fastenings, expansion joints in precast construction.

UNIT -IV

Production Technology - Choice of production setup, manufacturing methods, stationary and mobile production, planning of production setup, storage of precast elements, dimensional tolerances, acceleration of concrete hardening. Hoisting Technology - Equipment for hoisting and erection, techniques for erection of different types of members like beams, slabs, wall panels and columns, vacuum lifting pads.

UNIT -V

Applications - Designing and detailing of precast UNIT for factory structures, purlins, principal rafters, roof trusses, lattice girders, gable frames, single span single storied simple frames, single storied buildings, slabs, beams and columns. Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

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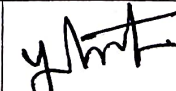
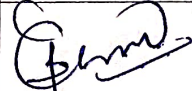
**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

TEXT BOOKS

1. Precast Concrete Structures – Kim S. Elliott – CRC Press – Boca Raton – 1st Edition – 2002
2. Building Materials and Components – CBRI – Central Building Research Institute – Roorkee, India – 1990
3. Knowledge-Based Process Planning for Construction and Manufacturing – C. Z. Gerostiza, C. Hendrickson & D. R. Rehat – Academic Press Inc. – San Diego – 1994

REFERENCES

1. Structural Design Manual: Precast Concrete Connection Details – Society for the Studies in the Use of Precast Concrete – Betor Verlag – Netherlands – 1978
2. Prefabricated Concrete for Industrial and Public Structures – L. Mekk – Publishing House of the Hungarian Academy of Sciences – Budapest – 1964

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

II Semester	EARTH RETAINING STRUCTURES	L	T	P	C
25SE2D15		3	0	0	3

Course Objectives:

1	To understand classical theories of earth pressure and their applications.
2	To study retaining walls, their stability requirements, and drainage provisions.
3	To learn the concepts and design of sheet pile structures.
4	To understand soil reinforcement techniques and reinforced earth retaining walls.
5	To study braced cuts and cofferdams with their design considerations.

Course Outcomes: At the end of the course,

CO1	Students will be able to compute active and passive earth pressures in soils using Rankine's and Coulomb's theories.
CO2	Students will be able to analyze different types of retaining walls and check their stability against failures.
CO3	Students will be able to design cantilever and anchored sheet piles using free earth and fixed earth methods.
CO4	Students will be able to design reinforced earth retaining walls by applying reinforcement principles.
CO5	Students will be able to design braced cuts and single-wall cofferdams considering stability and pressure conditions.

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Detailed Syllabus:

UNIT: 1

Earth pressures – Different types and their coefficients- Classical Theories of Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure- Computation of Lateral Earth Pressure in Homogeneous and Layered soils- Graphical solutions for Coulomb's Theory in active and passive conditions.

UNIT: 2

Retaining walls – different types - Type of Failures of Retaining Walls – Stability requirements – Drainage behind Retaining walls – Provision of Joints – Relief Shells.

UNIT: 3

Sheet Pile Structures – Types of Sheet piles – Cantilever sheet piles in sands and clays – Anchored sheet piles – Free earth and Fixed earth support methods – Rowe's moment reduction method – Location of anchors and Design of Anchorage system.

UNIT: 4

Soil reinforcement – Reinforced earth - Different components – their functions – Design principles of reinforced earth retaining walls.

UNIT: 5

Braced cuts and Cofferdams: Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects – TVA method and Cummins' methods.

TEXT BOOKS

1. Principles of Foundation Engineering – Braja M. Das – Cengage Learning – 7th Edition – 2010
2. Foundation Analysis and Design – J. E. Bowles – McGraw Hill – 5th Edition – 2001

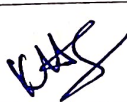
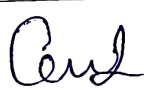
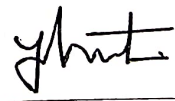
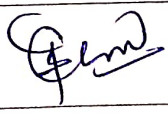
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DEPARTMENT OF CIVIL ENGINEERING**

REFERENCES

1. Soil Mechanics in Engineering Practice – K. Terzaghi & R. B. Peck – John Wiley & Sons – New York – 2nd Edition – 1967
2. Analysis and Design of Foundations and Retaining Structures – Shamsheer Prakash, Gopal Ranjan & Swami Saran – Sarita Prakashan – Meerut, India – 1st Edition – 1979
3. NPTEL course materials on Geo-synthetics and Earth Retaining Structures.

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

II Semester		L	T	P	C
25SE2D16	INDUSTRIAL STRUCTURES				
		3	0	0	3

Course Objectives:

1	To understand planning and functional requirements of industrial structures.
2	To study the design of structural components in industrial buildings.
3	To learn the concepts and analysis of folded plate structures.
4	To understand structural systems used in power plants.
5	To study transmission structures and their foundations.

Course Outcomes: At the end of the course,

CO1	Students will be able to plan layouts considering lighting, ventilation, fire safety, and vibration control.
CO2	Students will be able to design gantry girders, corbels, nibs, and machine foundations.
CO3	Students will be able to analyze and design multibay folded plates with diaphragm beams.
CO4	Students will be able to design bunkers, silos, chimneys, cooling towers, and containment structures.
CO5	Students will be able to design transmission line towers, tower foundations, and testing towers.

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Detailed Syllabus:

UNIT: 1

Planning and functional requirements- classification of industries and industrial structures- planning for layout- requirements regarding lighting ventilation and fire safety- protection against noise and vibrations

UNIT: 2

Industrial buildings- roofs for industrial buildings (Steel) - design of gantry girder- design of corbels and nibs- machine foundations

UNIT: 3

Design of Folded plates- Design considerations- analysis of folded plates- analysis of multibay folded plates- design of diaphragm beam

UNIT: 4

Power plant structures- Bunkers and silos- chimney and cooling towers-Nuclear containment structures

UNIT: 5

Power transmission structures- transmission line towers- tower foundations- testing towers

TEXT BOOKS

1. Advanced Reinforced Concrete Design – N. Krishnam Raju – CBS Publishers & Distributors – New Delhi – 2nd Edition – 2012
2. Handbook on Machine Foundations – P. Srinivasulu & C. V. Vaidyanathan – Tata McGraw-Hill Publishing Company – New Delhi – 1st Edition – 1976
3. Tall Chimneys: Design and Construction – S. N. Manohar – Tata McGraw-Hill Publishing Company – New Delhi – 1st Edition – 1985

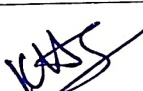
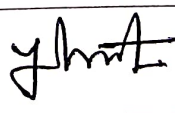
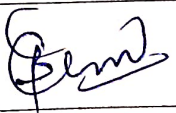
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REFERENCES:

1. Transmission Line Structures – S. S. Murthy & A. R. Santakumar – McGraw Hill Education – New Delhi – 1st Edition – 1991
2. SP 32: 1986 – Handbook on Functional Requirements of Industrial Buildings – Bureau of Indian Standards – New Delhi – 1986
3. Analysis of Thin Concrete Shells – K. Chandrasekhar – New Age International (P) Ltd. – New Delhi – 1st Edition – 1999.

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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II Semester	COMPUTER AIDED DESIGN LABORATORY	L	T	P	C
25SE2L03		0	1	2	2

Course Objectives:

1	To learn programming techniques for analyzing beams under various loadings.
2	To study analysis and design of reinforced concrete multistoried buildings using software.
3	To understand analysis of plane and space trusses.
4	To learn analysis of plane and space frames.
5	To study dynamic behavior of tall buildings using stick model approximation.

Course Outcomes: At the end of the course,

CO1	Students will be able to write programs to determine responses of beams subjected to different loads.
CO2	Students will be able to analyze and design RCC buildings in STADD or ETABS.
CO3	Students will be able to model and analyze trusses using structural analysis software.
CO4	Students will be able to perform software-based analysis of frame structures.
CO5	Students will be able to determine mode shapes and frequencies of tall buildings.

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Detailed Syllabus:

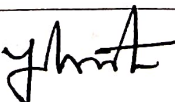
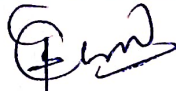
Analysis and Design using STADD, STADD FOUNDATION, ETABS, ANSYS

1. Programming for beams subject to different loading
2. Analysis and Design of reinforced concrete multistoried building
3. Analysis of plane and space truss
4. Analysis of plane and space frame
5. Determination of mode shapes and frequencies of tall buildings using lumped mass (stick model) approximation

NOTE: A minimum of Four from the above set have to be conducted.

REFERENCE:

Computer aided design laboratory (Civil Engineering) by Shesha Prakash and Suresh.S,
January 2016

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
ODALAREVU
DEPARTMENT OF CIVIL ENGINEERING**

II Semester	STRUCTURAL DESIGN LABORATORY	L	T	P	C
25SE2L04		0	1	2	2

Course Objectives:

1	To study the effect of wind loads on tall structures.
2	To understand the behavior of prestressed concrete bridge girders.
3	To learn analysis of cylindrical shell structures.
4	To study the structural behavior of bridge piers and abutments.
5	To understand dynamic analysis of multistory buildings.

Course Outcomes: At the end of the course,

CO1	Students will be able to analyze tall structures under wind actions using STAAD/ETABS
CO2	Students will be able to analyze prestressed girders using structural analysis software.
CO3	Students will be able to model and analyze cylindrical shells in ANSYS/STAAD.
CO4	Students will be able to analyze and design bridge substructures using STAAD Foundation.
CO5	Students will be able to evaluate mode shapes and responses of multistory structures under dynamic loads.

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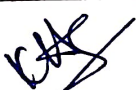
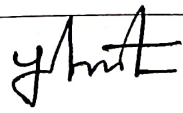
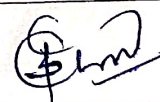
**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
ODALAREVU
DEPARTMENT OF CIVIL ENGINEERING**

Detailed Syllabus:

Analysis and Design using STADD, STADD FOUNDATION, ETABS, ANSYS

1. Wind analysis on tall structure
2. Analysis of pre stressed concrete bridge girder
3. Analysis of Cylindrical shell
4. Analysis of Bridge Pier and Abutment
5. Dynamic Analysis of Multistory structure

NOTE: A minimum of Four from the above set have to be conducted. REFERENCE:
Computer aided design laboratory (Civil Engineering) by Shesha Prakash and Suresh.S January 2016.

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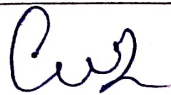
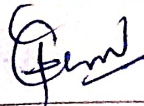
II Semester	Seminar -II	L	T	P	C
25SE2S02		0	0	2	1

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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SEMESTER – III

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

III Semester	RESEARCH METHODOLOGY & IPR / SWAYAM 12 WEEK MOOC COURSE ON RM & IPR	L	T	P	C
25HM3D01		3	0	0	3

COURSE OBJECTIVES:

- To understand the knowledge on basics of research and its types.
- To impart the concept of Literature Review, Technical Reading, Attributions and Citations.
- To know the Ethics in Engineering Research.
- To know the concepts of Intellectual Property Rights in Engineering.

COURSE OUTCOMES:

- CO1 Explain the meaning of engineering research and apply to develop an appropriate framework for research studies.
- CO2 Identify the procedure of Literature Review, Technical Reading, etc. and apply to develop a research design during their project work.
- CO3 Explain and apply the fundamentals of patent laws and drafting procedure in their research works.
- CO4 Demonstrate the copyright laws, subject matters of copyrights, designs etc. to apply in patent filing.
- CO5 Identify the new developments in IPR and employ the applications of computer software in writing/filing patents in future.

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

Detailed Syllabus

UNIT – I:

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT – II:

Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT – III:

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT – IV:

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT – V:

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR.

TEXTBOOKS:

1. C.R. Kothari , 2nd Edition, “Research Methodology: Methods and Techniques”.
2. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step-by-Step Guide for beginners”

REFERENCE BOOKS:

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students.
2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”.

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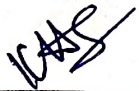
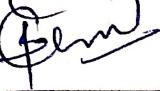


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3. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd, 2007.
4. Mayall, "Industrial Design", McGraw Hill, 1992.
5. Niebel, "Product Design", McGraw Hill, 1974.
6. Asimov, "Introduction to Design", Prentice Hall, 1962.
7. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
8. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

WEB REFERENCES:

- Please include hyperlinks related to NPTEL/VLabs etc.,

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

III Semester	Summer Internship/ Industrial training (8-10 weeks)	L	T	P	C
25SE3P01		0	0	0	3

COURSE OBJECTIVES:

- Internships provide students with an opportunity to put into practice skills they have learned while in college.
- In addition, students should have an opportunity to enhance those skills, obtain the perspective of a work environment and benefit from a mentor or supervisor's experience and advice.

COURSE OUTCOMES:

Upon successful completion of this course, the student will be able to:

	<i>Course Outcome</i>	<i>BTL (K#)</i>
CO1	Integrate theory and practice to assess interests and abilities in their field of study.	K3 & K4
CO2	Develop work habits, attitudes necessary to appreciate work and its function in the economy.	K3
CO3	Develop communication, interpersonal and other critical skills to build a record of work experience.	K3

Based on suggested Revised Blooms Taxonomy Level (BTL)

K1: Remember
K4: Analyse

K2: Understand
K5: Evaluate

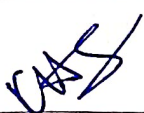
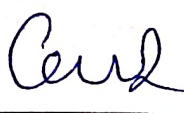
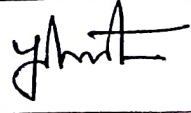
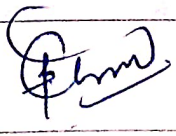
K3: Apply
K6: Create

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BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING

III Semester	Comprehensive Viva	L	T	P	C
25SE3V01		0	0	0	2

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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

III Semester	Dissertation Part-A	L	T	P	C
25SE3P02		0	0	20	10

COURSE OBJECTIVES:

- To impart fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study.
- To familiarise how to incorporate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.
- Expose to the critical aspects like identifying, analysing and solving problems creatively through sustained critical investigation using effective oral, written and visual communications.
- To inculcate the key aspects like awareness and application of appropriate personal, societal and professional ethical standards to excellence needed to engage in lifelong learning.

COURSE OUTCOMES:

Upon successful completion of this course, the student will be able to:

Course Outcome

**BTL
(K#)**

K3 & K4

CO1 Carryout a critical review of literature on a chosen topic of research and identify gaps in the literature to define a problem for research work.

K3 & K6

CO2 Formulate/adapt a clear methodology using multi-disciplinary approach and modern tools.

*# Based on suggested Revised
Blooms Taxonomy Level (BTL)*

K1: Remember

K2: Understand K3: Apply

K4: Analyse

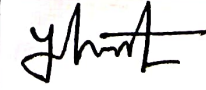
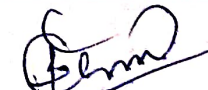
K5: Evaluate K6: Create

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BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING

SEMESTER – IV

Dr. K. Hanumanthu HOD & BOS Chair, Department of Civil Engineering, BVCEC Odalarevu.	Dr. V. Lakshmi, Professor, Department of Civil Engineering UCEK, JNTU Kakinada. (University Nominee)	Dr. A. Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi	Dr. B. Raghuram Kadali Assistant Professor Department of Civil Engineering NIT Warangal.	Dr. Y. Amarnath, Sr. Engineer Ananya Engineers, Anantapur.	Mr. P. Chakradhar Prasad Asst. Professor Department of Civil Engineering DNR College of Engineering Technology
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**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE (A),
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DEPARTMENT OF CIVIL ENGINEERING**

IV Semester	DISSERTATION PART B	L	T	P	C
25SE4P03		0	0	32	16

COURSE OBJECTIVES:

- To impart fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study.
- To familiarise how to incorporate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.
- Expose to the critical aspects like identifying, analysing and solving problems creatively through sustained critical investigation using effective oral, written and visual communications.
- To inculcate the key aspects like awareness and application of appropriate personal, societal and professional ethical standards to excellence needed to engage in lifelong learning.

COURSE OUTCOMES:

Upon successful completion of this course, the student will be able to:

	<i>Course Outcome</i>	<i>BTL (K#)</i>
CO1	Carryout design/analysis of a product/system or devise experiments to study and develop a system/process/product.	K3 & K4
CO2	Interpret & validate results of analysis/experiments conducted to study behaviour of a product /system/ process considered for the research leading to, valid conclusions that add value to the body of knowledge.	K3 & K5
CO3	Write and present a technical report of the project work.	K6
	<i># Based on suggested Revised Blooms Taxonomy Level (BTL)</i>	
	K1: Remember	K2: Understand
	K4: Analyse	K5: Evaluate
		K3: Apply
		K6: Create

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