



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	II/I
<b>Faculty Name:</b>		<b>Regulation</b>	R19

After completion of this course students will be able to:

<b>C211</b>	<b>Complex Variables and Statistical Methods</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C211.1</b>	<b>Apply</b> Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic	<b>Apply</b>
<b>C211.2</b>	<b>Solve</b> differentiation and integration of complex functions used in engineering problems	<b>Apply</b>
<b>C211.3</b>	<b>Use</b> of the Cauchy residue theorem to evaluate certain integrals	<b>Apply</b>
<b>C211.4</b>	<b>Apply</b> discrete and continuous probability distributions	<b>Apply</b>
<b>C211.5</b>	<b>Design</b> the components of a classical hypothesis test	<b>Create</b>
<b>C211.6</b>	<b>Infer</b> the statistical inferential methods based on small and large sampling tests	<b>Analyse</b>

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After completion of this course students will be able to:

<b>C212</b>	<b>Strength of Materials-I</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C212.1</b>	<b>Understand</b> the basic materials behavior under the influence of different external loading conditions and the support conditions.	<b>Understand</b>
<b>C212.2</b>	<b>Outline</b> the relationship between bending moment, shear force and rate of loading with the help of diagrams.	<b>Analyse</b>
<b>C212.3</b>	<b>Apply</b> the theory of simple bending to beams for computing the flexural strength across the section.	<b>Apply</b>
<b>C212.4</b>	<b>Apply</b> the theory of simple bending to beams for computing the shear stress across the section	<b>Apply</b>
<b>C212.5</b>	<b>Evaluate</b> the Slopes and Deflections in beams and trusses subjected to various load combinations using energy methods.	<b>Evaluate</b>
<b>C212.6</b>	<b>Apply</b> fluid pressure concepts for computing circumferential and longitudinal stresses and strains on thick and thin-walled cylinders.	<b>Apply</b>

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After completion of this course students will be able to:

<b>C213</b>	<b>Fluid Mechanics</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C213.1</b>	<b>Understand</b> Various Properties Of Fluids And Their Influence On Fluid Motion and <b>Analyse</b> Variety of Problems in Fluid Statics And Dynamics.	<b>Analyse</b>
<b>C213.2</b>	<b>Calculate</b> the Forces that Act on Submerged Planes and Curves.	<b>Apply</b>
<b>C213.3</b>	<b>Analyse</b> Various types Of Fluid Flows & draw simple hydraulic and energy gradient lines.	<b>Analyse</b>
<b>C213.4</b>	<b>Apply</b> Integral Forms of 3 Fundamental Laws of Fluid Mechanics to Turbulent And Laminar Flow to Predict Relevant Pressures, Velocities and Forces.	<b>Apply</b>
<b>C213.5</b>	<b>Measure</b> the quantities of Fluid Flowing In Pipes, Tanks And Channels.	<b>Evaluate</b>
<b>C213.6</b>	<b>Illustrate</b> the Concept of Boundary Layer To Practical Situations.	<b>Apply</b>

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After completion of this course students will be able to:

<b>C214</b>	<b>SURVEYING AND GEOMETRICS</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C214.1</b>	<b>Operate</b> and use surveying equipment.	<b>Apply</b>
<b>C214.2</b>	<b>Sketch</b> plan or map of the existing permanent features on the ground.	<b>Apply</b>
<b>C214.3</b>	<b>Classify</b> the ground features from the map or plan.	<b>Analyse</b>
<b>C214.4</b>	<b>Analyse</b> temporary adjustments and check permanent adjustments of the Theodolite	<b>Analyse</b>
<b>C214.5</b>	<b>Derive</b> different types of Curves & know their applications	<b>Create</b>
<b>C214.6</b>	<b>Evaluate</b> Construction Survey & Various Space Based Positioning System.	<b>Evaluate</b>

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After completion of this course students will be able to:

<b>C215</b>	<b>Building Materials, Construction and Planning</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C215.1</b>	<b>Identify</b> different building materials and their importance in building construction.	<b>Remember</b>
<b>C215.2</b>	<b>Categorize</b> brick masonry, stone masonry construction	<b>Analyse</b>
<b>C215.3</b>	<b>Use</b> Lime and Cement in various construction activities	<b>Apply</b>
<b>C215.4</b>	<b>Contrast</b> Building Components like arches, Trusses and lintel.	<b>Analyse</b>
<b>C215.5</b>	<b>Evaluate</b> the importance of building components and finishings.	<b>Evaluate</b>
<b>C215.6</b>	<b>Identify</b> the classification of aggregates, sieve analysis and moisture content usually required in building construction.	<b>Remember</b>

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After completion of this course students will be able to:

<b>C216</b>	<b>TRANSPORTATION ENGINEERING – I</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C216.1</b>	<b>Infer</b> highway network Plan for a given area.	<b>Analyse</b>
<b>C216.2</b>	<b>Determine</b> Highway alignment and design highway geometrics	<b>Apply</b>
<b>C216.3</b>	<b>Design</b> Intersections and prepare traffic management plans	<b>Create</b>
<b>C216.4</b>	<b>Judge</b> suitability of pavement materials.	<b>Evaluate</b>
<b>C216.5</b>	<b>Design</b> the flexible pavement and rigid pavement of Highway.	<b>Create</b>
<b>C216.6</b>	<b>Illustrate</b> Construction and maintainance of highways	<b>Analyse</b>

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<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	II/I
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After completion of this course students will be able to:

<b>C217</b>	<b>Strength of Materials Lab</b>	
<b>#CO</b>	<b>CO Statement</b>	<b>BTL</b>
<b>C217.1</b>	<b>Evaluate</b> the values of Tensile and compressive stresses of the given specimen.	<b>Evaluate</b>
<b>C217.2</b>	<b>Analyse</b> stress of various beams subjected to bending loads.	<b>Analyse</b>
<b>C217.3</b>	<b>Examine</b> the stiffness of the open coil and closed coil spring.	<b>Apply</b>
<b>C217.4</b>	<b>Evaluate</b> the capacity of a material to withstand torsional and shearing stresses.	<b>Evaluate</b>
<b>C217.5</b>	<b>Determine</b> the hardness, impact strength to analyze the application of a specific material.	<b>Apply</b>
<b>C217.6</b>	<b>Determine</b> the of stress, strain, deformation of material under different types of loading.	<b>Apply</b>

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<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	II/I
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After completion of this course students will be able to:

<b>C218</b>	<b>Survey Field Work - I</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C218.1</b>	<b>Apply</b> standard Practices to perform chain survey in the field and to plot from field data	<b>Apply</b>
<b>C218.2</b>	<b>Apply</b> Principles to Perform compass survey and plot from field data	<b>Apply</b>
<b>C218.3</b>	<b>Apply</b> basics of plane table survey for making plans and calculating areas	<b>Apply</b>
<b>C218.4</b>	<b>Apply</b> basic techniques and engineering tools for leveling.	<b>Apply</b>
<b>C218.5</b>	<b>Apply</b> knowledge of levelling in Longitudinal and cross sectioning for the given alignment	<b>Apply</b>
<b>C218.6</b>	<b>Explain</b> the methods of levelling and chaining.	<b>Understand</b>

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After completion of this course students will be able to:

<b>C219</b>	<b>CONSTITUTION OF INDIA</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C219.1</b>	<b>Understand</b> the importance of constitution	<b>Understand</b>
<b>C219.2</b>	<b>Understand</b> the structure of executive, legislature and judiciary	<b>Understand</b>
<b>C219.3</b>	<b>Evaluate</b> philosophy of fundamental rights and duties	<b>Evaluate</b>
<b>C219.4</b>	<b>Evaluate</b> the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.	<b>Evaluate</b>
<b>C219.5</b>	<b>Compare</b> Central and state relation financial and administrative.	<b>Analyse</b>
<b>C219.6</b>	<b>Differentiate</b> between structure and functions of state secretariat.	<b>Analyse</b>

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After completion of this course students will be able to:

<b>C221</b>	<b>Strength of Materials - II</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C221.1</b>	<b>Calculate</b> principal stresses, strains, and Theories of failures in the materials.	<b>Apply</b>
<b>C221.2</b>	<b>Apply</b> the torsion equation to springs, solid and hollow circular shafts for computing torsional stiffness of springs and power transmitted by shafts.	<b>Apply</b>
<b>C221.3</b>	<b>Derive</b> buckling of columns and struts under axial loading for understanding the behavior of column	<b>Create</b>
<b>C221.4</b>	<b>Determine</b> the Direct and Bending Stresses in the case of chimneys, retaining walls and dams	<b>Apply</b>
<b>C221.5</b>	<b>Calculate</b> the Deflection of beams under unsymmetrical bending and determine shear center for various cross sections.	<b>Apply</b>
<b>C221.6</b>	<b>Assess</b> forces in different types of trusses used in construction.	<b>Evaluate</b>

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After completion of this course students will be able to:

<b>C222</b>	<b>Hydraulics &amp; Hydraulic Machinery</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C222.1</b>	<b>Solve</b> uniform and non uniform open channel flow problems.	<b>Apply</b>
<b>C222.2</b>	<b>Outline</b> the Ideas and Importance of Critical Flow Parameters	<b>Analyse</b>
<b>C222.3</b>	<b>Examine</b> the Principles of Dimensional Analysis For building The Relationship Between Model And Prototypes.	<b>Apply</b>
<b>C222.4</b>	<b>Illustrate</b> the Similitude Concept for Testing of Engineering Models	<b>Apply</b>
<b>C222.5</b>	<b>Examine</b> the Principles of Dimensional Analysis and Similitude In Hydraulic Model Testing.	<b>Apply</b>
<b>C222.6</b>	<b>Assess</b> the Working Principles of Various Hydraulic Machinery and Pumps.	<b>Evaluate</b>

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After completion of this course students will be able to:

<b>C223</b>	<b>Engineering Geology</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C223.1</b>	<b>Explain</b> basic concepts, common rocks, minerals, their significance and application in civil engineering.	<b>Understand</b>
<b>C223.2</b>	<b>Testing</b> of geological material to check the suitability.	<b>Analyse</b>
<b>C223.3</b>	<b>Recognize</b> tectonic effects, Geological structures and their significance in Civil Engineering.	<b>Understand</b>
<b>C223.4</b>	<b>Classify</b> , monitor and measure the Landslides and subsidence	<b>Analyse</b>
<b>C223.5</b>	<b>Analyses</b> the ground conditions through geophysical surveys	<b>Analyse</b>
<b>C223.6</b>	<b>Investigate</b> the project site for mega/mini civil engineering projects. Siteselection for mega engineering projects like Dams, Tunnels	<b>Analyse</b>

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After completion of this course students will be able to:

<b>C224</b>	<b>Transportation Engineering - II</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C224.1</b>	<b>Design</b> geometrics of a railway track.	<b>Create</b>
<b>C224.2</b>	<b>Provide</b> good transportation network	<b>Understand</b>
<b>C224.3</b>	<b>Contrast</b> Turnouts & interlockings in Railway Track	<b>Analyse</b>
<b>C224.4</b>	<b>Design</b> Airport Geometrics and understand Airport Masterplan	<b>Create</b>
<b>C224.5</b>	<b>Design</b> Airport Runway and also evaluate its strengthly.	<b>Create</b>
<b>C224.6</b>	<b>Illustrate</b> Planning, construction and maintainance of Docks and Harbours.	<b>Apply</b>

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After completion of this course students will be able to:

<b>C225</b>	<b>Environmental Engineering - I</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C225.1</b>	<b>Estimate</b> Water demand and Population Forecasting using different Methods.	<b>Apply</b>
<b>C225.2</b>	<b>Illustrate</b> the Water conveyance & design aspects of Pipe lines.	<b>Apply</b>
<b>C225.3</b>	<b>Analyse</b> the Characteristics of water and compare them with IS standards.	<b>Analyse</b>
<b>C225.4</b>	<b>Describe</b> and <b>design</b> of Coagulation, Flocculation processes and Filtration.	<b>Create</b>
<b>C225.5</b>	<b>Evaluate</b> disinfection processes, water softening methods, demineralization, fluoridation and defluoridation.	<b>Evaluate</b>
<b>C225.6</b>	<b>Describe</b> and <b>Design</b> parts of water distribution systems	<b>Create</b>

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<b>C226</b>	<b>Engineering Geology Lab</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C226.1</b>	<b>Test</b> different Minerals to Identify their Mega-sopic properties.	<b>Evaluate</b>
<b>C226.2</b>	<b>Test</b> different Rocks to Identify their Mega-sopic properties.	<b>Evaluate</b>
<b>C226.3</b>	<b>Identify</b> the site parameters such as contour, slope & aspect for topography.	<b>Understand</b>
<b>C226.4</b>	<b>Analyse</b> the Occurance of strike & dip on the ground	<b>Analyse</b>
<b>C226.5</b>	<b>Assess</b> geological maps showing tilted beds, faults, unconformities.	<b>Evaluate</b>
<b>C226.6</b>	<b>Deterimine</b> the Strength of Rock using Laboratory Tests.	<b>Apply</b>

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<b>C227</b>	<b>Transportation Engineering Lab</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C227.1</b>	<b>Determine</b> engineering properties of Road aggregates.	<b>Apply</b>
<b>C227.2</b>	<b>Determine</b> index properties of Road aggregates.	<b>Apply</b>
<b>C227.3</b>	<b>Examine</b> the grade & properties of bitumen.	<b>Apply</b>
<b>C227.4</b>	<b>Outline</b> the various properties of bitumen material and mixes by performing various tests on it	<b>Analyse</b>
<b>C227.5</b>	<b>Calculate</b> the design speed, maximum speed and minimum speed limits of a location through spot speed.	<b>Apply</b>
<b>C227.6</b>	<b>Evaluate</b> the strength of subgrade soil by CBR test.	<b>Evaluate</b>

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<b>C228</b>	<b>Transportation Engineering Lab</b>	
<b>#CO</b>	<b>CO Statement</b>	<b>BTL</b>
<b>C228.1</b>	<b>Analyse</b> the flow discharge through venturi meter an orifice meter	<b>Analyse</b>
<b>C228.2</b>	<b>Determine</b> the rate of flow through notches	<b>Apply</b>
<b>C228.3</b>	<b>Determine</b> minor losses in the pipes	<b>Apply</b>
<b>C228.4</b>	<b>Apply</b> the principles of Bernoulli's equation in measurement of discharge in pipes, and in other pipe flow problems	<b>Apply</b>
<b>C228.5</b>	<b>Evaluate</b> the impact of jets on different vanes	<b>Evaluate</b>
<b>C228.6</b>	<b>Evaluate</b> the performance characteristics of hydraulic turbines and pumps	<b>Evaluate</b>

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**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	II/II
<b>Faculty Name:</b>		<b>Regulation</b>	R19

After completion of this course students will be able to:

<b>C228</b>	<b>Fluid Mechanics &amp; Hydraulics Machinery Lab</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C228.1</b>	<b>Analyse</b> the flow discharge through venturi meter an orifice meter	<b>Analyse</b>
<b>C228.2</b>	<b>Determine</b> the rate of flow through notches	<b>Apply</b>
<b>C228.3</b>	<b>Determine</b> minor losses in the pipes	<b>Apply</b>
<b>C228.4</b>	<b>Apply</b> the principles of Bernoulli's equation in measurement of discharge in pipes, and in other pipe flow problems	<b>Apply</b>
<b>C228.5</b>	<b>Evaluate</b> the impact of jets on different vanes	<b>Evaluate</b>
<b>C228.6</b>	<b>Evaluate</b> the performance characteristics of hydraulic turbines and pumps	<b>Evaluate</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	II/II
<b>Faculty Name:</b>		<b>Regulation</b>	R19

After completion of this course students will be able to:

<b>C229</b>	<b>Essence of Indian Traditional Knowledge / Professional Ethics and Human Values</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C229.1</b>	<b>Understand</b> philosophy of Indian culture	<b>Understand</b>
<b>C229.2</b>	<b>Distinguish</b> the Indian languages and literature among different traditions.	<b>Analyse</b>
<b>C229.3</b>	<b>Summarize</b> the philosophy of ancient, medieval and modern India.	<b>Understand</b>
<b>C229.4</b>	<b>Assess</b> the information about the fine arts in India.	<b>Evaluate</b>
<b>C229.5</b>	<b>Illustrate</b> the contribution of scientists of different eras.	<b>Apply</b>
<b>C229.6</b>	<b>Determine</b> the essence of Yogic Science for Inclusiveness of society.	<b>Apply</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C311</b>	<b>Management Science</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C311.1</b>	<b>Demonstrate</b> Skill about Management Functions, Global Leadership & Organizational behaviour.	<b>Apply</b>
<b>C311.2</b>	<b>Classify &amp; Analyse</b> functional management project management and strategic management.	<b>Analyse</b>
<b>C311.3</b>	<b>Demonstrate</b> Marketing Strategies, Job Evaluation & Merit Rating.	<b>Apply</b>
<b>C311.4</b>	<b>Differentiate</b> between CPM & Pert Methods & Identify Critical Path.	<b>Analyse</b>
<b>C311.5</b>	<b>Evaluate</b> SWOT analysis, Elements of Corporate planning.	<b>Evaluate</b>
<b>C311.6</b>	<b>Assess</b> Contemporary Management Practice.	<b>Evaluate</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C312</b>	<b>Engineering Geology</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C312.1</b>	<b>Explain</b> basic concepts, common rocks, minerals, their significance and application in civil engineering.	<b>Understand</b>
<b>C312.2</b>	<b>Testing</b> of geological material to check the suitability.	<b>Analyse</b>
<b>C312.3</b>	<b>Recognize</b> tectonic effects, Geological structures and their significance in Civil Engineering.	<b>Understand</b>
<b>C312.4</b>	<b>Classify</b> , monitor and measure the Landslides and subsidence	<b>Analyse</b>
<b>C312.5</b>	<b>Analyses</b> the ground conditions through geophysical surveys	<b>Analyse</b>
<b>C312.6</b>	<b>Investigate</b> the project site for mega/mini civil engineering projects. Siteselection for mega engineering projects like Dams, Tunnels	<b>Analyse</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C313</b>	<b>Structural Analysis – II</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C313.1</b>	<b>Analyse</b> two and three hinged arches and its application.	<b>Analyse</b>
<b>C313.2</b>	<b>Analyse</b> lateral Loads of structures & drawing SFD & BMD.	<b>Analyse</b>
<b>C313.3</b>	<b>Analyse</b> Cable and Suspension Bridge structures	<b>Analyse</b>
<b>C313.4</b>	<b>Illustrate</b> concept of static and kinematic indeterminacy, slope and deflection of determinate and indeterminate beams for analysis of structures.	<b>Apply</b>
<b>C313.5</b>	<b>Evaluate</b> structures using Moment Distribution, Kani's Method and Matrix methods	<b>Evaluate</b>
<b>C313.6</b>	<b>Analyse</b> indeterminate beams structures and frames.	<b>Analyse</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C314</b>	<b>Design and Drawing of Reinforced Concrete Structures</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C314.1</b>	<b>Apply</b> Fundamental Concepts Of Limit State Method And Working Stress Methods	<b>Apply</b>
<b>C314.2</b>	<b>Analyse</b> The Structural Behavior Of Reinforced Concrete Elements In Bending, Shear, Compression And Torsion	<b>Analyse</b>
<b>C314.3</b>	<b>Design</b> a structures Subjected To Shear, Bond And Torsion	<b>Create</b>
<b>C314.4</b>	<b>Design</b> Different type Of Compression Members subjected to different Loading	<b>Create</b>
<b>C314.5</b>	<b>Design</b> Different type Of Footings subjected to different Loading Conditions	<b>Create</b>
<b>C314.6</b>	<b>Analyse &amp; Design</b> different types of Slabs	<b>Create</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C315</b>	<b>Transportation Engineering – II</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C315.1</b>	<b>Design</b> geometrics of a railway track.	<b>Create</b>
<b>C315.2</b>	<b>Provide</b> good transportation network	<b>Understand</b>
<b>C315.3</b>	<b>Contrast</b> Turnouts & interlockings in Railway Track	<b>Analyse</b>
<b>C315.4</b>	<b>Design</b> Airport Geometrics and understand Airport Masterplan	<b>Create</b>
<b>C315.5</b>	<b>Design</b> Airport Runway and also evaluate its strength.	<b>Create</b>
<b>C315.6</b>	<b>Illustrate</b> Planning, construction and maintainance of Docks and Harbours.	<b>Apply</b>

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**Faculty Signature**





**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C316</b>	<b>Concrete Technology Lab</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C316.1</b>	<b>Outline</b> the importance of testing of cement and its properties	<b>Analyse</b>
<b>C316.2</b>	<b>Assess</b> the different properties of aggregate	<b>Evaluate</b>
<b>C316.3</b>	<b>Determine</b> the concept of workability and testing of concrete	<b>Apply</b>
<b>C316.4</b>	<b>Prepare</b> fresh concrete apparatus after finalising Mix Proportion.	<b>Create</b>
<b>C316.5</b>	<b>Evaluate</b> the properties of hardened concrete	<b>Evaluate</b>
<b>C316.6</b>	<b>Explain</b> the non-destructive testing procedures on concrete.	<b>Understand</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C317</b>	<b>Engineering Geology Lab</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C317.1</b>	<b>Test</b> different Minerals to Identify their Mega-sopic properties.	<b>Evaluate</b>
<b>C317.2</b>	<b>Test</b> different Rocks to Identify their Mega-sopic properties.	<b>Evaluate</b>
<b>C317.3</b>	<b>Identify</b> the site parameters such as contour, slope & aspect for topography.	<b>Understand</b>
<b>C317.4</b>	<b>Analyse</b> the Occurance of strike & dip on the ground	<b>Analyse</b>
<b>C317.5</b>	<b>Assess</b> geological maps showing tilted beds, faults, unconformities.	<b>Evaluate</b>
<b>C317.6</b>	<b>Deterimine</b> the Strength of Rock using Laboratory Tests.	<b>Apply</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C318</b>	<b>Transportation Engineering Lab</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C318.1</b>	<b>Determine</b> engineering properties of Road aggregates.	<b>Apply</b>
<b>C318.2</b>	<b>Determine</b> index properties of Road aggregates.	<b>Apply</b>
<b>C318.3</b>	<b>Examine</b> the grade & properties of bitumen.	<b>Apply</b>
<b>C318.4</b>	<b>Outline</b> the various properties of bitumen material and mixes by performing various tests on it	<b>Analyse</b>
<b>C318.5</b>	<b>Calculate</b> the design speed, maximum speed and minimum speed limits of a location through spot speed.	<b>Apply</b>
<b>C318.6</b>	<b>Evaluate</b> the strength of subgrade soil by CBR test.	<b>Evaluate</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C321</b>	<b>Design and Drawing of Steel Structures</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C321.1</b>	<b>Analyse</b> various Indian Standard codes and its application in design steelstructure.	<b>Analyse</b>
<b>C321.2</b>	<b>Analysis</b> and <b>Design</b> of flexural members and detailing them.	<b>Create</b>
<b>C321.3</b>	<b>Design</b> compression & Tension members of different types with connectiondetailing	<b>Create</b>
<b>C321.4</b>	<b>Design</b> eccentrically loaded column and column bases	<b>Create</b>
<b>C321.5</b>	<b>Design</b> Plate Girder and Gantry Girder with connection detailing	<b>Create</b>
<b>C321.6</b>	<b>Sketch</b> the drawings pertaining to different components of steel structures	<b>Apply</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C322</b>	<b>Geotechnical Engineering – I</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C322.1</b>	<b>Assess</b> Soil Structure & Clay Mineralogy & Understand Compaction & its Mechanism.	<b>Evaluate</b>
<b>C322.2</b>	<b>Classify</b> various types of Soil using different Concepts & Understand different Consistency Limits & Indices.	<b>Analyse</b>
<b>C322.3</b>	<b>Impart</b> the Concept of Seepage of The Water through Soils and <b>Determine</b> the Permeability of Water Through Soils.	<b>Apply</b>
<b>C322.4</b>	<b>Analyse</b> Boussinesq & Westergaad's theories for Stress Distribution in Soils.	<b>Analyse</b>
<b>C322.5</b>	<b>Impart</b> concept of Consolidation of Soils and <b>Determine</b> the Rate & degree of Consolidation.	<b>Apply</b>
<b>C322.6</b>	<b>Determination</b> of Shear Strength of Soils using Mohr's Coulomb failure Theories & Stress- Strain behaviour of Sand & Clay.	<b>Apply</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C323</b>	<b>Environmental Engineering – I</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C323.1</b>	<b>Estimate</b> Water demand and Population Forecasting using different Methods.	<b>Apply</b>
<b>C323.2</b>	<b>Illustrate</b> the Water conveyance & design aspects of Pipe lines.	<b>Apply</b>
<b>C323.3</b>	<b>Analyse</b> the Characteristics of water and compare them with IS standards.	<b>Analyse</b>
<b>C323.4</b>	<b>Describe</b> and <b>design</b> of Coagulation, Flocculation processes and Filtration.	<b>Create</b>
<b>C323.5</b>	<b>Evaluate</b> disinfection processes, water softening methods, demineralization, fluoridation and defluoridation.	<b>Evaluate</b>
<b>C323.6</b>	<b>Describe</b> and <b>Design</b> parts of water distribution systems	<b>Create</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C324</b>	<b>Water Resources Engineering–I</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C324.1</b>	<b>Interpret</b> the components of Water Cycle & its measurement for Evolving the effects of Hydrology.	<b>Understand</b>
<b>C324.2</b>	<b>Illustrate</b> the factors effecting the rate of Evaporation & Infiltration for reducing the water loss in the Environment.	<b>Apply</b>
<b>C324.3</b>	<b>Develop</b> hydrographs for the Rainfall-Runoff data to design Storage Capacity & Life of Reservoirs.	<b>Create</b>
<b>C324.4</b>	<b>Estimate</b> the Flood Magnitude & carry out Flood Routing.	<b>Apply</b>
<b>C324.5</b>	<b>Examine</b> different Aquifer properties & their uses for Construction of Well.	<b>Apply</b>
<b>C324.6</b>	<b>Examine</b> the Rainfall- Runoff Models for the advance Computation of Hydrograph.	<b>Apply</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C325</b>	<b>OPEN ELECTIVE: Waste Water Management</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C325.1</b>	<b>Analyse</b> the Quality & Quantity requirements of Water in different stages of production in different industries.	<b>Analyse</b>
<b>C325.2</b>	<b>Assess</b> different Treatment methods used for removal of Impurities in Industries.	<b>Evaluate</b>
<b>C325.3</b>	<b>Differentiate</b> between Unit Operations & Unit Processes employed for Industrial Waste water Management.	<b>Analyse</b>
<b>C325.4</b>	<b>Decide</b> the need of common effluent treatment plant for the industrial area in their vicinity	<b>Evaluate</b>
<b>C325.5</b>	<b>Outline</b> the manufacturing process & treatment methods employed at different Industrials.	<b>Analyse</b>
<b>C325.6</b>	<b>Apply</b> their Knowledge to Suggest Suitable treatment methods for any industrial wastewater.	<b>Apply</b>

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**Faculty Signature**





**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C326</b>	<b>Geotechnical Engineering Lab</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C326.1</b>	<b>Evaluate</b> the different types of soil and their engineering properties and classify them.	<b>Evaluate</b>
<b>C326.2</b>	<b>Evaluate</b> the different types of soil and their Index properties and classify them.	<b>Evaluate</b>
<b>C326.3</b>	<b>Determine</b> the soil properties in laboratory and develop a proficiency in handling experimental data.	<b>Apply</b>
<b>C326.4</b>	<b>Analyse</b> engineering properties like compaction, permeability, soil shear strength.	<b>Analyse</b>
<b>C326.5</b>	<b>Analyse</b> the Compression test results from Triaxial and Unconfined Compression test.	<b>Analyse</b>
<b>C326.6</b>	<b>Perform</b> CBR test and <b>Analyse</b> the test results for different test conditions.	<b>Analyse</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C327</b>	<b>Environmental Engineering Lab</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C327.1</b>	<b>Estimate</b> the characteristics of water, waste water and soil in the laboratory.	<b>Evaluate</b>
<b>C327.2</b>	<b>Decide</b> whether the water is Potable or not.	<b>Evaluate</b>
<b>C327.3</b>	<b>Estimate</b> Chloride, EC and Salinity of Soil and suggest their suitability for Construction/Agriculture.	<b>Evaluate</b>
<b>C327.4</b>	<b>Estimate</b> the pollution characteristics of waste water by analyzing DO, BOD and COD.	<b>Evaluate</b>
<b>C327.5</b>	<b>Calculate</b> the amount of coagulant required for optimum sedimentation for a given Turbid sample.	<b>Apply</b>
<b>C327.6</b>	<b>Assess</b> physical parameters of water as turbidity and colour.	<b>Evaluate</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	III/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C328</b>	<b>Computer Aided Engineering Drawing</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C328.1</b>	<b>Draw</b> Projections of solids inclined to both planes on Paper	<b>Create</b>
<b>C328.2</b>	<b>Develop</b> Surfaces of Right Regular Solids & Interpenetrate them.	<b>Create</b>
<b>C328.3</b>	<b>Develop</b> Isometric & Perspective projections and Transform them.	<b>Create</b>
<b>C328.4</b>	<b>Develop</b> the components using 2D and 3D wire frame models through various editing commands.	<b>Create</b>
<b>C328.5</b>	<b>Understand</b> & use various modelling techniques such as edit, zoom, cross hatching, pattern filling, rotation, etc.	<b>Understand</b>
<b>C328.6</b>	<b>Generate</b> assembly of various components of compound solids.	<b>Create</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C411</b>	<b>Environmental Engineering – II</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C411.1</b>	<b>Determine</b> the sewage characteristics and comprehend the quality and quantity of sewage.	<b>Apply</b>
<b>C411.2</b>	<b>Choose</b> The Appropriate Appurtenances In The Sewerage Systems	<b>Evaluate</b>
<b>C411.3</b>	<b>Analyse</b> Sewage And Suggest And Design Suitable Treatment System For Sewage Treatment	<b>Analyse</b>
<b>C411.4</b>	<b>Design</b> secondary treatment units along with activated sludge process and trickling filters.	<b>Create</b>
<b>C411.5</b>	<b>Design</b> a Septic tank and understand the working & disposal mechanism of its effluents.	<b>Create</b>
<b>C411.6</b>	<b>Understand</b> the Sludge Characteristics & Effective Handeling of it.	<b>Understand</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C412</b>	<b>Water Resources Engineering–II</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C412.1</b>	<b>Estimate</b> Irrigation Water Requirements & Irrigation Efficiencies.	<b>Evaluate</b>
<b>C412.2</b>	<b>Design</b> Irrigation Canals And Canal Network while Considering different Theories.	<b>Create</b>
<b>C412.3</b>	<b>Design</b> of Canal Structures like Falls, Regulators, Cross Drainage Works etc.	<b>Create</b>
<b>C412.4</b>	<b>Evaluate</b> various Theories used to design Diversion Head Works.	<b>Evaluate</b>
<b>C412.5</b>	<b>Analyse</b> stability of gravity and earth dams	<b>Analyse</b>
<b>C412.6</b>	<b>Design</b> ogee spillways and energy dissipation works.	<b>Create</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C413</b>	<b>Geotechnical Engineering - II</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C413.1</b>	<b>Analyse</b> the Stability of earth Slopes using different Methods & finding the stability number.	<b>Analyse</b>
<b>C413.2</b>	<b>Analyse</b> Rankine's & Columb's theory of Earth Pressure in normal & layered Soils.	<b>Analyse</b>
<b>C413.3</b>	<b>Estimate</b> the Bearing Capacity for Shallow Foundation along with Settlement Criteria.	<b>Evaluate</b>
<b>C413.4</b>	<b>Apply</b> the principles of bearing capacity of piles and design them accordingly.	<b>Apply</b>
<b>C413.5</b>	<b>Estimate</b> Design Criteria and Construction parameters for Well Foundation	<b>Evaluate</b>
<b>C413.6</b>	<b>Determine</b> Soil Exploration Methods & prepare soil Investigation report.	<b>Apply</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C414</b>	<b>Remote Sensing and GIS Applications</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C414.1</b>	<b>Understand</b> and be familiar With Ground, Air And Satellite Based Sensor Platforms	<b>Understand</b>
<b>C414.2</b>	<b>Analyse</b> and Interpret The Aerial Photographs And Satellite Imageries	<b>Analyse</b>
<b>C414.3</b>	<b>Create</b> and Input Spatial Data For GIS Application	<b>Create</b>
<b>C414.4</b>	<b>Apply</b> RS And GIS Applications In General	<b>Apply</b>
<b>C414.5</b>	<b>Apply</b> RS And GIS Concepts In Water Resources Engineering	<b>Apply</b>
<b>C414.6</b>	<b>Understand</b> the principles of spatial analysis	<b>Understand</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C415</b>	<b>ELECTIVE-I - GROUND IMPROVEMENT TECHNIQUES</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C415.1</b>	<b>Outline</b> purpose of ground improvement techniques to obtain the suitable construction site for long-lasting structures	<b>Analyse</b>
<b>C415.2</b>	<b>Illustrate</b> the various methods of ground improvement techniques to increase load bearing capacity of beneath and surface soils.	<b>Apply</b>
<b>C415.3</b>	<b>Determine</b> importance of admixtures and its composition for injecting the material into the soils	<b>Apply</b>
<b>C415.4</b>	<b>Analyse</b> the practical applications of reinforced soil and grid reinforced soils for better strength and durability of soils	<b>Analyse</b>
<b>C415.5</b>	<b>Outline</b> various functions of Geosynthetics and their applications in Civil Engineering practice.	<b>Analyse</b>
<b>C415.6</b>	<b>Illustrate</b> various grouting techniques and its applications for improving load bearing of beneath soils	<b>Apply</b>

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**Faculty Signature**





**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C416</b>	<b>Elective II - Environmental Impact Assessment &amp; Management</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C416.1</b>	<b>Understand</b> the role of stakeholder and public hearing in the preparation of EIA	<b>Understand</b>
<b>C416.2</b>	<b>Choose</b> appropriate EIA methodology for Impact assessment.	<b>Evaluate</b>
<b>C416.3</b>	<b>Apply</b> RS & GIS for the Assessment of Soil & Ground water	<b>Apply</b>
<b>C416.4</b>	<b>Assess</b> the Impact Significance & Identification of Mitigation Measures.	<b>Evaluate</b>
<b>C416.5</b>	<b>Analyse</b> the Risk Assessment and management.	<b>Analyse</b>
<b>C416.6</b>	<b>Prepare</b> EMP, EIS & EIA Reports & evaluation the EIA report	<b>Create</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C417</b>	<b>IPR &amp; Patents</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C417.1</b>	<b>Illustrate</b> the significance of practice and procedure of Patents.	<b>Apply</b>
<b>C417.2</b>	<b>Illustrate</b> the statutory provisions of different forms of IPRs in simple forms.	<b>Apply</b>
<b>C417.3</b>	<b>Outline</b> the procedure of obtaining Patents, Copyrights, Trade Marks & Industrial Design.	<b>Analyse</b>
<b>C417.4</b>	<b>Examine</b> types of Intellectual Properties (IPs), Right of ownership, scope of protection & ways to create and extract value from IP.	<b>Apply</b>
<b>C417.5</b>	<b>Compare</b> the crucial role of IP in organizations of different industrial sectors for product and technology development.	<b>Evaluate</b>
<b>C417.6</b>	<b>Understanding</b> the Framework of Strategic Management of Intellectual Property (IP).	<b>Understand</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C418</b>	<b>GIS &amp; CAD Lab</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C418.1</b>	<b>Create</b> and digitize the thematic map and extract important features	<b>Create</b>
<b>C418.2</b>	<b>Develop</b> digital elevation model	<b>Create</b>
<b>C418.3</b>	<b>Analyse</b> and design 2D & 3D trusses using structural analysis software	<b>Analyse</b>
<b>C418.4</b>	<b>Analyse</b> and design 2D & 3D frames using structural analysis software	<b>Analyse</b>
<b>C418.5</b>	<b>Design</b> and Analyse retaining wall using CADD software	<b>Create</b>
<b>C418.6</b>	<b>Design</b> and Analyse simple towers using CADD software	<b>Create</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/I
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C419</b>	<b>Irrigation Design &amp; Drawing</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C419.1</b>	<b>Design</b> Surplus Weir of an Irrigation Structure.	<b>Create</b>
<b>C419.2</b>	<b>Design</b> Tank sluice with a tower head of an Irrigation Structure.	<b>Create</b>
<b>C419.3</b>	<b>Design</b> Canal drop-Notch type of an Irrigation Structure.	<b>Create</b>
<b>C419.4</b>	<b>Design</b> Canal regulator of an Irrigation Structure.	<b>Create</b>
<b>C419.5</b>	<b>Design</b> Under tunnel of an Irrigation Structure.	<b>Create</b>
<b>C419.6</b>	<b>Design</b> Syphon aqueduct type III of an Irrigation Structure.	<b>Create</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C421</b>	<b>Estimating, Specifications &amp; Contracts</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C421.1</b>	<b>Explain</b> terms related to estimation along with preparation of approximate estimate.	<b>Understand</b>
<b>C421.2</b>	<b>Outline</b> Rate Analysis with Working out data for various Items.	<b>Analyse</b>
<b>C421.3</b>	<b>Create</b> Bar Bending Schedule for the given structure.	<b>Create</b>
<b>C421.4</b>	<b>Examine</b> contracts, types of contract and conditions of contract	<b>Apply</b>
<b>C421.5</b>	<b>Conclude</b> the quantities to prepare the detailed estimate	<b>Evaluate</b>
<b>C421.6</b>	<b>Develop</b> Detailed Estimation of a Building using different methods.	<b>Create</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C422</b>	<b>Construction Technology &amp; Management</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C422.1</b>	<b>Understand</b> the basic Qualities of a Project Manager along with the study of different Charts.	<b>Understand</b>
<b>C422.2</b>	<b>Illustrate</b> Resource Allocation & review Project Evaluation.	<b>Apply</b>
<b>C422.3</b>	<b>Outline</b> the functioning of various earthwork equipment and their handling.	<b>Analyse</b>
<b>C422.4</b>	<b>Outline</b> the functioning of various Concrete equipment and their handling.	<b>Analyse</b>
<b>C422.5</b>	<b>Evaluate</b> Various Construction Methods at different stages of Construction.	<b>Evaluate</b>
<b>C422.6</b>	<b>Infer</b> Quality Control and Safety norms while performing Construction activity.	<b>Analyse</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C423</b>	<b>Prestressed Concrete</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C423.1</b>	<b>Understand</b> the Basic concept of Prestressing along with its Types & Characteristics.	<b>Understand</b>
<b>C423.2</b>	<b>Analyse</b> a Prestressed Member and can draw its Stress diagram	<b>Analyse</b>
<b>C423.3</b>	<b>Calculate</b> the Total Losses of Pre-stressing in the member due to various Causes.	<b>Apply</b>
<b>C423.4</b>	<b>Design</b> for Flexural resistance along with knowledge about Deflection Control.	<b>Create</b>
<b>C423.5</b>	<b>Design</b> for Shear & Torsion as per Codal Provisions.	<b>Create</b>
<b>C423.6</b>	<b>Analyse</b> End Zone & Anchorage Zone Reinforcement in Prestressed Member.	<b>Analyse</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C424</b>	<b>Elective III - Solid and Hazardous Waste Management</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C424.1</b>	<b>Classify</b> Solid Waste & factors Influencing it & Measurement of Calorific Value.	<b>Analyse</b>
<b>C424.2</b>	<b>Suggest</b> various Collection methods for Solid waste along with Onsite Handling, Storage & Processing.	<b>Understand</b>
<b>C424.3</b>	<b>Categorise</b> various Unit Operations for transformation of Solid Waste.	<b>Analyse</b>
<b>C424.4</b>	<b>Choose</b> various Energy & Material Recovery methods.	<b>Evaluate</b>
<b>C424.5</b>	<b>Apply</b> various disposal methods and post disposal effects of municipal solid wastes	<b>Apply</b>
<b>C424.6</b>	<b>Breakdown</b> Origin, handling & disposal methods employed for Hazardous Waste.	<b>Analyse</b>

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**Faculty Signature**





**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C425</b>	<b>Seminar on Internship Project</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C425.1</b>	<b>Recognise</b> any topic of interest and develop a thought process for technical presentation.	<b>Understand</b>
<b>C425.2</b>	<b>Analysis</b> and comprehension of proof-of-concept and related data.	<b>Analyse</b>
<b>C425.3</b>	<b>Grade</b> a detailed literature survey and build a document with respect to technical publications.	<b>Evaluate</b>
<b>C425.4</b>	<b>Apply</b> tools and techniques to Present the report.	<b>Apply</b>
<b>C425.5</b>	<b>Create</b> technical reports using the Summarized Data	<b>Create</b>
<b>C425.6</b>	<b>Develop</b> effective presentation and improve soft skills.	<b>Create</b>

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**Faculty Signature**



**D.N.R COLLEGE OF ENGINEERING & TECHNOLOGY::BHIMAVARAM**

**DEPARTMENT OF CIVIL ENGINEERING**

**Course Outcomes**

<b>Program Name:</b>	B.TECH	<b>AY</b>	2020-21
<b>Course Name:</b>	CIVIL ENGINEERING	<b>Class / Sem</b>	IV/II
<b>Faculty Name:</b>		<b>Regulation</b>	R16

After completion of this course students will be able to:

<b>C426</b>	<b>Project Work</b>	<b>BTL</b>
<b>#CO</b>	<b>CO Statement</b>	
<b>C426.1</b>	<b>Identify</b> thrust area in civil engineering and finalize problem statement.	<b>Remember</b>
<b>C426.2</b>	<b>Review</b> the literature to search for technical information from various resources on selected problem.	<b>Understand</b>
<b>C426.3</b>	<b>Formulate</b> the appropriate solution methodology.	<b>Analyse</b>
<b>C426.4</b>	<b>Apply</b> all levels of Engineering knowledge for solving the problems.	<b>Apply</b>
<b>C426.5</b>	<b>Apply</b> the principles, tools and techniques to solve the problem.	<b>Apply</b>
<b>C426.6</b>	<b>Work</b> in a group as a part of multidisciplinary team with professional responsibility	<b>Apply</b>
<b>C426.7</b>	<b>Analysis</b> and design of structure to meet desired needs within realistic constraints.	<b>Analyse</b>
<b>C426.8</b>	<b>Plan</b> activity schedule and implementation in a given time span.	<b>Evaluate</b>
<b>C426.9</b>	<b>Prepare</b> a report and presentation of project.	<b>Create</b>

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