



Shri Rawatpura Sarkar University, Raipur, Chhattisgarh
Faculty of Engineering

Shri Rawatpura Sarkar University,
Dhaneli, Raipur



Examination Scheme & Syllabus

for

B.Tech In Civil Engineering

Semester-VII

Outcome Based Education (OBE) and Choice Based Credit System
(CBCS)

(Effective from the Session: 2022-23)



Shri Rawatpura Sarkar University, Raipur, Chhattisgarh

Faculty of Engineering Four Years B.Tech. Programme

Scheme of Teaching and Examination

B.Tech. Seventh Semester Civil Engineering

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2022-2023)

S.No	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	T	P		Continuou s Evaluation	Sem End Exam	Total	
1	BENCE701T	Quantity Surveying and Cost Evaluation	3	1	-	4	30	70	100	3
2	BENCE701P	Quantity Surveying and Cost Evaluation	-	-	2	1	15	35	50	-
3	BENCE702T	Structural Engineering Design-III	3	1	-	4	30	70	100	3
	BENCE702P	Structural Engineering Design - III	-	-	2	1	15	35	50	-
4	BENCE703T	Elective- II	3	1	-	4	30	70	100	3
5	BENCE704T	Environmental Engineering-II	3	1	-	4	30	70	100	3
6	BENCE704P	Environmental Engineering - II	-	-	2	1	15	35	50	-
7	BENCE705P	Minor Project	-	-	2	1	15	35	50	-
8	BENCE706P	Industrial Training & Seminar	-	-	2	1	15	35	50	-
Total Contact Hours Per Week: 26			Total Credit: 21			Grand Total Marks			750	

L: Lecture T: Tutorial P: Practical

Elective-II

S.NO.	Course Title
1	Remote Sensing and GIS
2	Earth and Earth Retaining Structure
3	Advanced Concrete Technology
4	Urban Transportation Planning



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Course Title	Quantity Survey And Cost Evaluation			
Course Code	BENCE701T			
Course Credits	L	T	P	TC
	3	1	-	4
Prerequisites	Knowledge of Building Materials & Construction Techniques			
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Provide an understanding of estimate, their types, items and units of work, and types of approximate estimate. • Provide an understanding of determining quantity estimate of civil engineering works. • Provide an understanding of rate analysis and its application to different items. • Provide an understanding of general requirements of contracts. • Provide an understanding of the concept of valuation of properties. 			
Course Contents	<p>UNIT-I</p> <p>Introduction To Estimation Introduction to quantity surveying, methods of measurements and units of measurements of various items of work, Principles of estimating, different types of estimates, procedure for computation of stage I estimate.</p> <p>General Terms: Administrative approval, technical sanction, competent authority, Deposit works, suspense account, imprest account, indent of stores, muster roll. Measurement book, material at site account, stock account, establishment charges, contingencies.</p> <p>UNIT-II</p> <p>Quantity Estimate Methods, data required for estimation detailed estimates of residential building works of single and double storey, determining quantities of actual reinforcement in building components, bar bending schedule, making bill of quantities, determination of earth work in road and canals.</p> <p>UNIT-III</p> <p>Analysis of Rates Purpose and principles factors affecting the rates of items of works, Analysis of rates of different items such as cement concrete of different proportions, brick masonry in different mortars, flooring (tiles, mosaic, cement concrete flooring), use of Schedule of rates.</p> <p>Specifications: Purpose and basic principles, types of specifications: brief and detailed specifications for various items of works.</p>			



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	<p>UNIT-IV</p> <p>Contracts General requirements of contract, types of contract, conditions, termination of contract, brief idea about types of tender, tender notice, earnest money, security deposit, liquidated damages, arbitration, and escalation.</p> <p>UNIT-V</p> <p>Valuation of Property General, object of valuation, definitions of terms related to valuation, methods of determining value of property, development method and rental method of valuation, concept of capitalized value and year purchase, depreciation, lease, mortgage, easement.</p>
Course outcome	<p>After the completion of course:</p> <ul style="list-style-type: none">• Students are expected to identify various items of building and able to determine approximate estimate of buildings.• Students are expected to determine quantities estimate of civil engineering works from given details.• Students are expected to know about determination of quantities of materials and rate analysis of any items in residential building works.• Students are expected to know contract and its types.• Students are expected to know concept of valuation.
Text Books	<ol style="list-style-type: none">1. Estimating and Costing in Civil Engineering – B.N. Dutta (UBS Publishers, New Delhi)2. Estimating and Costing and specifications – M. Chakrabarty (UBS Publishers, New Delhi)
Reference Books	<ol style="list-style-type: none">1. Textbook of Estimating and Costing – G.S. Birdi (Dhanpat Rai Publications)2. Valuation of real properties – S.C. Rangwala (Charotar Publication)3. A Textbook of Estimating and Costing – Kohli & Kohli (S. Chand &Co.)



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Course Title	Quantity Surveying And Cost Evaluation				
Course Code	BENCE701P				
Course Credits	L	T	P	TC	
	-	-	2	1	
Prerequisites	Knowledge of Quantity Surveying and Cost Evaluation				
Course Objective	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Provide an understanding of estimate, their types, items and units of work, and types of approximate estimate. • Provide an understanding of determining quantity estimate of civil engineering works. • Provide an understanding of rate analysis and its application to different items. • Provide an understanding of general requirements of contracts. • Provide an understanding of the concept of valuation of properties. 				
Course Content	<p>Experiments to be performed (Min 10 experiments):</p> <ul style="list-style-type: none"> • Estimating cost of a proposed building on Plinth area method, Volume area method. • Estimated cost of a proposed building from materials and labour by CBRI method. • Calculation of wall area in a building by measuring floor area for ordinary building and framed structure. • Calculation of approximate cost of water supply, sanitation, electrical works for a building. • Preparation of approximate estimate for road projects. • Preparation of detailed estimate of a building. • Analysis of rates: Concrete work, Brick work, Plaster, Flooring. • Use of PWD schedule of rates for determining cost of a building project. • Determination of present value of a building valuation. • Development method of valuation of plots in a locality. • Estimation of quantity of reinforcement and preparing bar bending schedule from a working and drawing for a building. • Rate analysis using software: R.C.C. items, Masonry work, Plastering, Road work. 				
Course Outcome	<p>After the completion of course:</p> <ul style="list-style-type: none"> • Students are expected to identify various items of building and able to determine approximate estimate of buildings. 				



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	<ul style="list-style-type: none">• Students are expected to determine quantities estimate of civil engineering works from given details.• Students are expected to know about determination of quantities of materials and rate analysis of any items in residential building works.• Students are expected to know contract and its types.• Students are expected to know concept of valuation.
Text Books	<ol style="list-style-type: none">1. Estimating and Costing – Rangawala (Charotar Publications).2. Estimating and Costing – Dutta B.N. (UBS Publishers & Distributors).
Reference Books	<ol style="list-style-type: none">1. Textbook of Estimating and Costing – G.S. Birdi (Dhanpat Rai Publications)2. Valuation of real properties – S.C. Rangwala (Charotar Publication)3. A Textbook of Estimating and Costing – Kohli & Kohli (S. Chand &Co.)



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Course Title	Structural Engineering Design – III				
Course Code	BENCE702T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Knowledge of Basic Structural Engineering Design-I & II				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Understand the behavior of plate girders. • Understand the behavior of members subjected to combined forces. • Understand the behavior of column bases and gantry girders. • Understand the behavior of eccentric and moment connections. • Understand the behavior of roof trusses under different loads. 				
Course Contents	<p>UNIT-I</p> <p>Plate Girders With Solid Webs Components of a Plate Girder, Typical sections, Proportioning of the section, Design bending strength, Design shear strength, Stiffened Web panels, minimum web thickness, bearing stiffeners, load carrying stiffeners, intermediate stiffeners, stiffener design, Design of beams and plate girders with solid webs.</p> <p>UNIT-II</p> <p>Members Subjected To Combined Forces Combined shear & bending, combined axial force & bending moment, section strength, over all member strength, Design of members subjected to combined forces.</p> <p>UNIT-III</p> <p>Column Bases and Gantry Girders Types of column bases, slab base, gusset base, moment resisting base plates. Loads and load combinations, Typical sections, Design of gantry girders.</p> <p>UNIT-IV</p> <p>Eccentric and Moment Connections Analysis of Bolt / Weld Group, Connection Configurations, Beam to Column connections, Beam to Beam connections, web splice and its connections, column splice and its connections.</p>				



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	<p>UNIT-V</p> <p>Roof Trusses Types of roof trusses, Loads - Dead , Imposed and wind loads, load combinations, Design of Purlins, Analysis & Design of roof trusses (with angle sections).</p> <p>Note :All designs should be as per latest version of code(IS:800-2007) IS: 800-2007 and Steel Tables are permitted in Examination.</p>
Course Outcomes	<p>After the completion of course:</p> <ul style="list-style-type: none">• Capable of designing Plate Girders.• Capable of designing members subjected to combined forces.• Capable of designing Column bases & Gantry Girders.• Capable of designing eccentric and Moment connections.• Capable of designing Roof trusses.
Text Books	<ol style="list-style-type: none">1. Design of Steel Structures - N. Subramanian (Oxford University Press)2. Limit State Design of Steel Structures – S. K. Duggal (Tata McGraw Hill)
Reference Books	<ol style="list-style-type: none">1. Indian Standard – General Construction in Steel –Code of Practice (3rd Revision) (IS:800 –2007)2. Design of Steel Structures – K. S. Sai Ram (Pearson Education)3. Structural Steel Design : LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education)4. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning)5. Limit State Design of Steel Structures (IS:800-2007) – V. L. Shah, V. Gore (Structures Publications)6. Design Manual for Designing Steel Structures according to New IS:800, Publication Number INS/PUB/114 – Institute for Steel Development and Growth, Kolkata7. Teaching Resource for Structural Steel Design, Vol. I – III, Publication Number INS/PUB/051, Institute for Steel Development and Growth, Kolkata



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Course Title	Structural Engineering Design - III				
Course Code	BENCE702P				
Course Credits	L	T	P	TC	
	-	-	2	1	
Prerequisites	Design of Steel Structures & Structural Engineering Design –III				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Understand the behavior of plate girders. • Understand the behavior of members subjected to combined forces. • Understand the behavior of column bases and gantry girders. • Understand the behavior of eccentric and moment connections. • Understand the behavior of roof trusses under different loads. 				
Course Contents	<p>Experiments to be performed (Min 10 experiments):</p> <ul style="list-style-type: none"> • Drawing of plan and section of various types of bolted and welded joints. • Detailing of a Axially Loaded angle Tension Member • Detailing of an Axially Loaded Compression Member with base plate. • Detailing of an Axially Loaded Built up Laced Compression Member. • Detailing of an Axially Loaded Built up Battened Compression Member. • Detailing of a Riveted / Bolted Plate girder. • Detailing of a Welded Plate girder. • Detailing of flexible connections • Detailing of Semi – Rigid Connections • Detailing of Rigid Connections • Detailing of a Industrial shed • Detailing of a Truss Bridge Railway Bridge. • Preparation of Bill of Materials • Preparation of Fabrication drawings. • Preparation of Erection drawings. 				
Course Outcome	<p>After the completion of course:</p> <ul style="list-style-type: none"> • Capable of designing Plate Girders. • Capable of designing members subjected to combined forces. • Capable of designing Column bases & Gantry Girders. • Capable of designing eccentric and Moment connections. • Capable of designing Roof trusses. 				
Text Books	<ol style="list-style-type: none"> 1. Design of Steel Structures – K. S. Sai Ram (Pearson Education) 2. Structural Steel Design : LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education) 				



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	<ol style="list-style-type: none">3. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning)4. Limit State Design of Steel Structures (IS:800-2007) – V. L. Shah, V. Gore (Structures Publications)
Reference Books	<ol style="list-style-type: none">1. Design Manual for Designing Steel Structures according to New IS:800, Publication Number INS/PUB/114 – Institute for Steel Development and Growth, Kolkata2. Teaching Resource for Structural Steel Design, Vol. I – III, Publication Number INS/PUB/051, Institute for Steel Development and Growth, Kolkata



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Course Title	Elective-II (Remote Sensing and GIS)				
Course Code	BENCE703T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites					
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Understand the basic concept of Remote Sensing and know about different types of satellite and sensors. • Illustrate Energy interactions with atmosphere and with earth surface features, Interpretation of satellite and topo sheet maps. • Understand different components of GIS and Learning about map projection and coordinate system. • Develop knowledge on conversion of data from analogue to digital and working with GIS software 				
Course Contents	<p>UNIT-I</p> <p>Introduction and Concepts Introduction of Remote Sensing – Energy sources and Radiation principles, Energy equation, EMR and Spectrum, EMR interaction with atmosphere scattering, absorption, EMR interaction with earth surface features reflection, absorption, emission and transmission, Spectral response pattern , vegetation, soil, water bodies- Spectral reflectance.</p> <p>UNIT-II</p> <p>Aerial Photography and Photogrammetry Introduction Terrestrial and Aerial photographs - vertical and oblique photographs - height determination contouring - photographic interpretations - stereoscopy – parallax bar- Flight Planning- Photo Interpretation, Applications of aerial photos-photo theodolite.</p> <p>UNIT-III</p> <p>Satellite Remote Sensing Principles Data acquisition –Procedure, Reflectance and Digital numbers- Intensity Reference data, Ground truth, Analog to digital conversion, Detector mechanism-spectro- radiometer-ideal remote sensing system – characters of real and successful remote sensing system- platforms and sensors- orbits type – resolution.</p>				



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	<p>UNIT-IV</p> <p>Remote Sensing Satellites Land observation satellites, characters and applications, IRS series, LANDSAT series, SPOT series, High resolution satellites, character and applications, CARTOSAT series, IKONOS Series, QUICKBIRD series, Weather/Meteorological satellites, INSAT series, NOAA, GOES, NIMBUS Applications, Marine observation satellites OCEANSAT.</p> <p>UNIT-V</p> <p>Basics of GIS: Introduction, concepts , information system , components of GIS, History, Geospatial data architecture, Operations, geographic co-ordinate systems, map projections, concepts, input data for GIS , display ,types of output products. GIS categories, Level and scale of Measurement, importance of data quality.</p>
<p>Course Outcomes</p>	<p>After the completion of course:</p> <ul style="list-style-type: none"> • Understand the concepts of Photogrammetry and compute the heights of objects; • Understand the principles of aerial and satellite remote sensing, able to comprehend the energy interactions with earth surface features, spectral properties of water bodies; • Understand the basic concept of GIS and its applications, know different types of data representation in GIS; • Understand and Develop models for GIS spatial Analysis and will be able to know what are the questions that GIS can answer and • Apply knowledge of GIS software and able to work with GIS software in various application fields.
<p>Text Books</p>	<ol style="list-style-type: none"> 1. M. Anji Reddy, Textbook of Remote Sensing and Geographical Information systems, BS Publications, Hyderabad. 2011. ISBN: 81-7800-112-8. 2. A.M.Chandra and S.K. Gosh. Remote Sensing and GIS, Narosa Publishing Home, New Delhi 2009.
<p>Reference Books</p>	<ol style="list-style-type: none"> 1. Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman Remote sensing and image interpretation John Wiley & Sons, 2008. 2. George Joseph, Fundamentals of Remote Sensing Universities Press, Hyderabad.



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Course Title	Elective-II (Earth and Earth Retaining Structure)				
Course Code	BENCE703T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites					
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Know the in-depth knowledge of various failures mechanism related to earth retaining structures. • Understand the types of retaining wall, stability of retaining walls. • Understand sheet pile and cofferdam, method of construction and distribution of earth pressure. • Understand the historical failures of geotechnical structures. • Understand the effect of water table on slopes. 				
Course Contents	<p>UNIT- I</p> <p>Earth Pressure Theories Theories of earth pressure, general and local states of plastic equilibrium, Active and Passive states in cohesive and cohesion less soil, Rankine's and Coulomb's approaches, Effect of wall movement, uniform surcharge, wall angle, wall friction, back fill slope. Lateral pressure on wall due to concentrated construction, Culmanns method, earth pressure at rest. Introduction to seismic design of retaining wall.</p> <p>UNIT- II</p> <p>Stability of Earth Retaining Structures Types of retaining wall, stability analysis of rigid type and R.C. Cantilever type retaining walls. Introduction of Geo reinforce Wall, Gabion Wall, Soil Nailing.</p> <p>UNIT-III</p> <p>Sheet Pile and Cofferdam Sheet pile and cofferdam. Type, material, method of construction. Distribution of earth pressure and related approximation. Distinction between Sheet Pile and Retaining Wall, Analysis and Design.</p> <p>UNIT- IV</p> <p>Characterization of Failures & Stability of Slopes Historical Failures of geotechnical structures(finite and infinite slopes, high embankments such as earthen dams, tunnels, excavations, Rock fall, landslides and retaining structures etc.,)</p>				



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	<p>Stability Of Slopes- Causes and types of slope failure, stability analysis of infinite slopes and finite slopes, center of critical slip circle, slices method and friction circle. Slopes with pore pressure consideration. Taylor's stability numbers & stability charts, method of improving stability of slopes.</p> <p>UNIT- V</p> <p>Effect of Water Table On Slopes Effect of water table on slopes, tension cracks, Stability of earth dams during different stages-during and at end of construction. Steady seepage, Sudden draw down, estimation of pore water pressure, Use of stability charts.</p>
Course Outcomes	<p>After the completion of course:</p> <ul style="list-style-type: none">• Think logically for mechanism of earth retaining structures.• Differentiate different types of retaining wall and understand the engineering concepts of stability of retaining walls.• Understand about sheet pile and cofferdam and best suitable techniques for construction.• Gain an experience in from historical failures of geotechnical structures.• Gain the knowledge of effect of water table on slopes.
Text Books	<ol style="list-style-type: none">1. Basic and Applied Soil Mechanics Gopal Ranjan and Rao New Age International Publisher Edition 2005.2. Principles of Geotechnical Engineering Das B.M. Thomson Bksm Cengage Publication Edition 2002.3. Soil Mechanics and Foundation Engineering, Vol-I VNS Murthy Saikripa Consultant, Banglore Edition 1991.
Reference Books	<ol style="list-style-type: none">1. Foundation Engineering Handbook Winterkon H.F. and Fang H



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Course Title	Elective-II (Advance Concrete Technology)				
Course Code	BENCE703T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Knowledge of Concrete Technology				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Develop Fundamental knowledge of properties of concrete and its ingredients. • Acquire an interest in concrete technology and admixture and its filled requirements 				
Course Contents	<p>UNIT-I</p> <p>Concrete Making Materials Aggregates classification, IS Specifications, Properties, Grading, Methods of combining aggregates, specified grading, Testing of aggregates, Types of Fibers. Cement, Grade of cement, Chemical composition, Testing of concrete, Hydration of cement, Structure of hydrated cement, Special cements.</p> <p>UNIT-II</p> <p>Properties of Concrete And Admixtures Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage, Variability of concrete strength. Water Chemical admixtures, Mineral admixture.</p> <p>UNIT-III</p> <p>Concrete Mix Design Principles of concrete mix design, Methods of concrete mix design, Testing of concrete.</p> <p>UNIT-IV</p> <p>Special Concrete Light weight concrete, Fly ash concrete, Fibre reinforced concrete, Polymer Concrete, Super plastic is ed concrete, Epoxy resins and screeds for rehabilitation - Properties and Applications - High performance concrete.</p> <p>UNIT-V</p> <p>Concreting Methods Process of manufacturing of concrete, methods of transportation, placing and</p>				



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	curing - Extreme weather concreting, special concreting methods, Vacuum dewatering - underwater concrete, special form work.
Course Outcomes	After the completion of course: <ul style="list-style-type: none">• Develop knowledge on various materials needed for concrete manufacture.• Know about the properties and admixture of concrete.• Apply the rules to do mix designs for concrete by various methods.• Explain about various special concrete.• Develop the methods of manufacturing of concrete.
Text Books	<ol style="list-style-type: none">1. Properties of Concrete – Neville, A.M., (Pitman Publishing Limited, London)2. Concrete Technology – Shetty M.S., (S.Chand and Company Ltd. Delhi)
Reference Books	<ol style="list-style-type: none">1. Light Weight Concrete Academic Kiado – Rudhani G. (Publishing Home of Hungarian Academy of Sciences, 1963)2. Concrete Technology – M.L. Gambhir (Tata McGraw Hill)3. Concrete Technology – R.S. Varshney (Oxford, IBH Publishers)



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Course Title	Elective-II (Urban Transportation Planning)				
Course Code	BENCE703T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Nil				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> ● Students should be able to explain and describe improving transport economic efficiency for transport providers and business user. ● Students should be able to explain, generate alternatives for improving transportation system. ● Students should be able to describe the future demand and selecting the best alternative after proper evaluation. ● Improve mobility levels for the urban poor through promotion of affordable urban transport plans, programmes and technologies. ● Increase the efficiency of existing transport operations through improved planning and management of all modes of transport. 				
Course Contents	<p>UNIT-I</p> <p>Urbanization and Transportation Importance of urban area, Structure of urban area, Urban design, Use of road space, Classification of urban roads</p> <p>UNIT-II</p> <p>Urban Transportation Characteristics Factors influencing transportation needs, Transportation demand, Type of trips, Mode of travel, urban transportation scene in India, Road congestion, Impact of transport on environment</p> <p>UNIT-III</p> <p>Transportation Planning Process Urban transportation planning objectives, Urban transportation system, Urban transportation planning process, Data collection Surveys for data collection, Environmental impact analysis</p>				



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	<p>UNIT-IV</p> <p>Travel Demand Forecasting Trip generation and attraction analysis, Trip distribution models, Model split analysis, Route assignment analysis</p> <p>UNIT-V</p> <p>Public Transportation, Innovations in Urban Transportation Bus transport characteristics, bus route planning, performance indicator Types of rail transit, rail transit system development in Indian cities, Integrated Transport System, Modes of Integrated transport systems. Need for innovative approaches, Track guided bus, BRT, GIS, ITS, Functional areas of ITS</p>
Course Outcomes	<p>After the completion of course:</p> <ul style="list-style-type: none">• Explain the characteristic of urban transportation, structure of urban transportation and classification of urban roads.• Describe the objectives of transportation planning, data collection for planning and environmental impact analysis.• Explain the process of travel demand forecasting & need for interation in different modes of transportation.• Describe the use of intelligent Transport System and need to accommodate non-motorized transports.
Text Books	<ol style="list-style-type: none">1. Traffic Engineering and Transport Planning L R Kadiyali Khanna Edition I2. Urban Transportation D. J. Victor & S. Ponnuswamy Tata McGraw – Hill Butter Edition I
Reference Books	<ol style="list-style-type: none">1. Transport Planning and Traffic engineering C A O' Flaherty Butter Edition I2. Urban Transportation Planning Meyer & Eric Miller McGraw - Hill Edition II



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Course Title	Environmental Engineering-II				
Course Code	BENCE704T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Knowledge Of Treatment Of Sewage, Industrial Waste, Solid Waste & Land Fill Techniques				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Give an overview of importance of proper sewage disposal and various sewerage systems. • Introduce the students the estimation of domestic sewage and other sewer appurtenances. • Impart a detailed knowledge in the design of various sewage treatment processes. • Impart knowledge about the different industrial waste treatment technique. • Provide knowledge about the environmental social and health implications of solid waste and its management. 				
Course Contents	<p>UNIT-I</p> <p>Estimate of Sewage Sewage and Sewerage, definitions and some common terms, object of sewage disposal. System of sanitation: Conservancy systems, Water system, sewage system-combined, separate and partially separate, patterns of collection system. Amount of sewage: Estimation of domestic and storm sewage, variations in the quantity of sewage, Design of sewers (Only circular sewer) Manholes, Pumping stations, and Wet well capacity.</p> <p>UNIT-II</p> <p>Sewage Treatment Characteristics of sewage: Physical, chemical and biological characteristics, fundamentals of aerobic & anaerobic process.</p> <p>Sewage treatment: Preliminary treatment systems, Racks and screens, comminute Grit chambers.</p> <p>Primary treatment systems: Plain sedimentation, detention time and over-flow rates, types of inlets and outlets, onsite wastewater treatment- septic tank, Imhoff tank, oxidation pond.</p> <p>UNIT-III</p> <p>Secondary Treatment Systems</p>				



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	<p>Attached growth process: Trickling filters, standard and high rates, efficiency (NRC) formula, and operational problems of trickling filters. Suspended growth process, principle of suspended growth process, Activated sludge process, Oxidation ditch aeration and mixing techniques, Operational problems of activated sludge systems, stabilization tools aerobic, anaerobic and facultative lagoon.</p> <p>UNIT-IV</p> <p>Sewage Sludge Treatment and Sewage Disposal Importance, amount and characteristics of sludge, sludge digestion, Anaerobic digestion, aerobic digestion, sludge drying beds. Disposal by dilution, self-purification of polluted streams, factors affecting self-purification, Sag curve, disposal on land surfaces. Stream standards, Effluent standards, theories of waste treatment (Volume reduction, strength reduction, new Equalization and proportioning) Summary of Industrial waste, its origin, character and treatment.</p> <p>UNIT-V</p> <p>Solid Waste Management Solid waste management, source and characteristics, environmental and health implications, refuse characteristics, collection methods, disposal of solid waste by land filling, composting and incineration methods. Collection and disposal of refuse, Composting of refuse.</p>
<p>Course Outcomes</p>	<p>After the completion of course:</p> <ul style="list-style-type: none"> • Student must be capable of designing a sewer system for a city taking into consideration the variations inflow. • Student should be capable of managing controlling the sewage treatment plant with complete knowledge of the design values and this functioning. • Student must be able to decide upon the quantum of treatment to be given to the wastewater from different sources before they are discharged to open watercourses. • Student must be able to analyze coming from various processes in an industry and decide upon the techniques of treatment to be given. • Student will be socially responsible and aware of the social, environmental and health implications of solid waste and its management
<p>Text Books</p>	<ol style="list-style-type: none"> 1. Environmental Engineering – Peavy& Rowe (Tata McGraw Hill, New Delhi). 2. Waste Water Engineering – S.K. Garg (Khanna Publication). 3. Waste Water Engineering – B.C. Punmia (Laxmi Publication, New Delhi)
<p>Reference Books</p>	<ol style="list-style-type: none"> 1. Environmental Science and Engineering – Henry and Heinke (Pearson Education). 2. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi). 3. Introduction to Environmental Science – Y Anjaneyulu (B S Publications). 4. Environmental Science and Engineering – henry and heinke (Pearson Education). 5. Waste Water Engineering – Metcalt Eddy (Tata McGraw Hill, New Delhi)



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Course Title	Environmental Engineering-II				
Course Code	BENCE704P				
Course Credits	L	T	P	TC	
	-	-	2	1	
Prerequisites	Environmental Engineering-II				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Give an overview of importance of proper sewage disposal and various sewerage systems. • Introduce the students the estimation of domestic sewage and other sewer appurtenances. • Impart a detailed knowledge in the design of various sewage treatment processes. • Impart knowledge about the different industrial waste treatment technique. • Provide knowledge about the environmental social and health implications of solid waste and its management. 				
Course Contents	<p>Experiments to be performed (Min 10 experiments):</p> <ul style="list-style-type: none"> • To determine acidity of Sewage / Industrial wastewater sample. • To determine Alkalinity of Sewage / Industrial wastewater sample. • To determine Hardness of Sewage / Industrial wastewater sample. • To determine Chloride Content of Sewage / Industrial wastewater sample. • To determine DO Content of Sewage / Industrial wastewater sample. • To determine Estimation of BOD of Sewage / Industrial wastewater sample. • To determine Optimum Coagulant Dose Test of Sewage / Industrial wastewater. • Determination of Total Solids in Sewage / Industrial wastewater. • Determination of Turbidity in Sewage / Industrial wastewater. • Determination of MPN in Sewage / Industrial wastewater. • Determination of COD in Sewage / Industrial wastewater. • Determination of Fluoride content in Sewage / Industrial wastewater. • Determination of Nitrates in Sewage / Industrial wastewater. • Determination of Phosphates in Sewage / Industrial wastewater. • Determination of Iron in Sewage / Industrial wastewater. • Microbiological Examination of Sewage / Industrial wastewater. 				



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Course Outcome	<p>After the completion of course:</p> <ul style="list-style-type: none">• Student must be capable of designing a sewer system for a city taking into consideration the variations in flow.• Student should be capable of managing controlling the sewage treatment plant with complete knowledge of the design values and this functioning.• Student must be able to decide upon the quantum of treatment to be given to the wastewater from different sources before they are discharged to open water courses.• Student must be able to analyze coming from various processes in an industry and decide upon the techniques of treatment to be given.• Student will be socially responsible and aware of the social, environmental and health implications of solid waste and its management.
Text Books	<ol style="list-style-type: none">1. Environmental Engineering Lab Manual – Dr. B. Kottaiah & N. Kumaraswamy (Charotar Publications).2. Environmental Science and Engineering – Henry and Heinke (Pearson Education).3. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).4. Introduction to Environmental Engineering and Science – Masters, G.M. (Prentice Hall of India Pvt. Ltd., 1991).
Reference Books	<ol style="list-style-type: none">1. Waste Water Engineering – S.K. Garg (Khanna Publication).2. Waste Water Engineering – B.C. Punmia (Laxmi Publication, New Delhi)



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Course Title	Minor Project				
Course Code	BENCE705P				
Course Credits	L	T	P	TC	
	-	-	2	1	
Prerequisites	Students Should Have Entire Knowledge of Civil Engineering				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Develop professional abilities such as persuasion, confidence, and perseverance and communication skill. • Collect the information for a given project. • Develop presentation skill. 				
Course Contents	<p>Minor Project Skills to be developed: Intellectual skills:</p> <ul style="list-style-type: none"> • Decide and collect data for projects. • Read and interpret the drawing, data. • Design the components. • Apply the principles rules regulations and byelaws. <p>• Motor skills:</p> <ul style="list-style-type: none"> ○ Plan for different phases of a task. ○ Prepare drawings for project. ○ Use of computer for drawing, networking. <p>• Work in a group for a given task.</p> <p>List of Projects: Following is the list /areas of suggested civil engineering projects to be undertaken by a group of 4 to 6 students .The project can be selected from any four civil engineering system like Building construction system, transportation engineering system, and irrigation engineering system. A topic for project can also be selected on recent development in civil engineering.</p> <p>The Project Report Shall Be In The Following Format:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Topic and objectives <input type="checkbox"/> Collection of data, required survey work, <input type="checkbox"/> Management and construction procedure <input type="checkbox"/> Resources scheduling and networking <input type="checkbox"/> Design details <input type="checkbox"/> Required drawing set <input type="checkbox"/> Utility to society if any <input type="checkbox"/> Conclusion <p>List Of Civil Engineering Projects:</p> <ol style="list-style-type: none"> 1) K.T. Weir 2) Lift Irrigation scheme. 3) Micro irrigation –Drip/Sprinkler Irrigation. 				



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	<p>4) Junction planning for city roads/planning for roads for congested area/parking Studies etc.</p> <p>5) Water shed development of small catchments.</p> <p>6) Rain water harvesting for domestic or public building.</p> <p>7) Campus development.</p> <p>8) Interior decoration.</p> <p>9) Concrete mix design.</p> <p>Learning Resources:</p> <p>1) Civil Engineering Hand Books / Reference books.</p> <p>2) Civil Engineering Magazines</p> <p>3) Relevant IS / International codes.</p> <p>4) PWD Handbooks / M.I. Manuals</p> <p>5) Material / Machinery / Product Catalogue.</p>
Course Outcomes	After the completion of course: <ul style="list-style-type: none">• Exposition of professional approach of students towards knowledge gain.



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Course Title	Industrial Training and Seminar			
Course Code	BENCE706P			
Course Credits	L	T	P	TC
	-	-	2	1
Prerequisites	Communication Skill Must Be Perfect. & Field Visit			
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Trained the students in field work so as to have first-hand knowledge of practical problems in carrying out engineering tasks. • Develop skills in facing and solving the field problems. 			
Course Contents	<p>The purpose of industrial training is to offer wide range of practical exposures to latest practices, equipment's and techniques used in the field. This training programme will help the student in acquiring hands on experiences of various practices and events required to perform in different job situations. Through the industrial training the students are given an opportunity to develop psychomotor skills and problem solving ability. The students will have to go for industrial training in the following areas:</p> <p>Building work Irrigation work Water supply and sanitary work Housing and construction work Road construction</p> <p>The duration of industrial training will be of four weeks and organised after the end of IV semester examination. The industrial Training has basically the following three components: -</p> <ol style="list-style-type: none"> 1. Orientation Programme 2. Industrial Training in the Industry 3. Report Writing and Evaluation 			
Course Outcomes	<p>After the completion of course:</p> <ul style="list-style-type: none"> • The intricacies of implementation textbook knowledge into practice • The concepts of developments and implementation of new techniques 			