



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Technology and Science

Choice Based Credit System (CBCS) in Light of NEP-2020

B.Tech. in Civil Engineering

(2021-2025)

COURSE CODE	CATE-GORY	COURSE NAME	TEACHING & EVALUATION SCHEME								CREDITS	
			THEORY			PRACTICAL		L	T	P		
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*					
BTCE601	DCC	Water Resources Engineering	60	20	20	0	0	3	1	0	4	

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

To impart the knowledge for understanding elementary aspects of hydrology and Fluvial Hydraulics for use in the planning, design, and management of water resources projects. Also to impart understanding of introductory aspects of integrated water resources development and management

Course Outcomes (COs):

1. Understand hydrologic data observation, processing, and analysis.
2. Learn methods of flood estimation and flood routing
3. Understand ground water development and utilization.
4. Learn soil, water, crop relationship and irrigation requirement.
5. Learn canal design procedure and familiarization with various hydraulic structures.

Syllabus

UNIT I

9 Hrs.

Hydrology: Hydrological cycle; Precipitation and its measurement; Rain gauge networks; Estimating missing rainfall data, mean depth of precipitation over a drainage area; Mass rainfall curves, intensity-duration curves and depth-area duration curves; Infiltration and infiltration indices; Evaporation and its measurement.

UNIT II

8 Hrs.

Runoff and Floods: Stream gauging; Run off and its estimation; Unit hydrograph derivation and application, S-curve hydrograph, synthetic unit hydrograph, Types of floods and methods of estimation; Flood routing through reservoirs and channels; Flood control measures; Economics of flood control.

UNIT III

8 Hrs.

Ground Water and Well Irrigation: Aquifer properties, hydraulics of wells under steady flow conditions; Ground water recharge-necessity and methods of improving ground water storage; Types of well, specific capacity and specific yield; Advantages and disadvantages of well irrigation.

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UNIT IV

10 Hrs.

Irrigation Water Requirement and Soil-Water-Crop Relationship: Irrigation, necessity, irrigation development in India; Soils, suitability, wilting coefficient and field capacity; Consumptive use and its determination; Irrigation methods; Duty of water, factors affecting duty; Crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

UNIT V

8 Hrs.

Canals and Structures: Types of canals; Canal alignment, Kennedy's and Lacey's silt theories, typical canal sections; Canal losses, lining-objectives, materials used, economics; Introduction to hydraulic structures viz. dams, spillways, weirs, barrages, canal regulation structures.

Textbooks:

1. Irrigation & Waterpower Engineering; by B.C. Punamia & Pande, B.B. Lal; Laxmi Publications, Revised edition (2016)
2. Water Resources Engineering Irrigation Engineering & Hydraulic Structures Vol-2; by Santosh Kumar Garg; Khanna Publishers.
3. Engineering Hydrology; by K. Subramanya; Tata McGraw-Hill Education Pvt. Ltd, 4th edition (2013)

References:

1. Water Resources Engineering; by Ray K. Linsley; Tata McGraw Hill, 3rd Revised edition (1979)
2. Hydrology and Water Resources Engineering Vol-1; by Santosh Kumar, Khanna Publishers.

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BTCE603	DCC	Geotechnical Engineering-II	60	20	20	30	20	2	1	2	4					

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

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Course Educational Objectives (CEOs):

The objective of this course is to provide the students necessary geotechnical engineering skills to analyze and design shallow and deep foundation systems under different loading and soil conditions.

Course Outcomes (COs):

Students will be able to

1. Understand the different types of foundation and suitable foundation system for a structure.
2. Understand about various analysis and design of foundations.
3. Identify and assess ground conditions and suggest method of improvement.

Syllabus

UNIT I

9 Hrs.

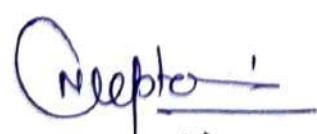
Shallow Foundations and Bearing capacity: Type of foundations shallow and deep; Bearing capacity of foundation on cohesion less and cohesive soils; General and local shear failures; Factors effecting bearing capacity of soil; Theories of bearing capacity - Prandtl, Terzaghi's, Skempton, Meyerhof and Hansan; Indian standard code for bearing capacity; Limits of total and differential settlements; Plate load test.

UNIT II

9 Hrs.

Deep Foundation and Estimation of capacity piles foundation: Pile foundation-introduction, types of piles; Estimation of individual and group capacity of piles in cohesion less and cohesive soils; Static and dynamic formulae; Pile load test, settlement of pile group; Negative skin friction; Well foundation. Equilibrium of wells; Analysis for stability for tilts and shifts, remedial measures.


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UNIT III

8 Hrs.

Soil Improvement Techniques: Compaction, factors affecting compaction, properties of soil affected by compaction; Field and laboratory methods; Proctor compaction tests; Equipment for field compaction and their suitability. Soil Stabilization: Mechanical, lime, cement, bitumen, chemical, thermal, electrical stabilization, and stabilization by grouting; Geo-synthetics, types, functions, materials and uses.

UNIT IV

9 Hrs.

Soil Exploration and Foundations on Expansive and Collapsible soils: Soil exploration, methods of soil exploration; Planning of exploration programme for buildings, highways, and earthen dams; Disturbed and undisturbed samples and samplers; Characteristics of expansive and collapsible soils, their treatment; Construction techniques on expansive and collapsible soils; CNS layer.

UNIT V

8 Hrs.

Sheet piles/Bulkheads and Machine foundation: Classification of sheet piles/bulkheads; Cantilever and anchored sheet piles; Cofferdams, materials, types and applications; Modes of vibration; Mass-spring analogy; Natural frequency; Effect of vibration on soils; Vibration isolation; Design criteria for impact type of machine.

Text Books:

1. Soil Mechanics and Foundation Engineering, Dr. K.R. Arora, Standard Publishers Delhi, 2020.
2. Soil Mechanics and Foundation Engineering Dr. B. C. Punamia, Laxmi Publications, Delhi, 2017.
3. Geotechnical Engineering, C. Venkatramiah –New Age International Publishers, Delhi, 2018.

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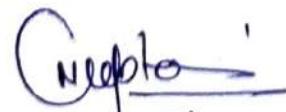
References:

1. Soil Mechanics and Foundation Engineering, S.K. Garg, Khanna Publishers, Delhi.
2. Geotechnical Laboratory Manual
3. Relevant I.S. Codes.

List of Experiments.

1. Determination of the natural content of the given soil sample.
2. Indian Standard Light Compaction Test/Std. Proctor Test
3. Indian Standard Heavy Compaction Test/Modified Proctor Test
4. Determination of unconfined compressive strength using Unconfined Compression Test
5. Determination of Shear Strength Parameters for Triaxial Compression Test
6. Determination of Shear Strength using laboratory Vane shear test
7. Determination of bearing capacity of soil sample using California Bearing Test(CBR Test)
8. Study of Plate Load Test SPT & DCPT


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BTCE604	DCC	Design of Steel Structures	60	20	20	30	60	2	1	2	4

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Course Educational Objectives (CEOs):

Student will be able to analyze structure for various loads and will be able to design different structural systems, as per provisions of latest IS: 800:2007.

Course Outcomes (COs):

Students will be able to

1. Analyze various loads and design bolted and welded connections.
2. Design compression and tension member.
3. Design different types of beams and girders.
4. Design structures trusses and industrial frames.

Syllabus

UNIT I

8 Hrs.

Connections: Properties of steel; Structural steel sections; Limit State Design Concepts; Loads on structures; Design of structural connections-Bolted and Welded connections; Eccentric connections.

UNIT II

9 Hrs.

Tension Members: Design of tension members and its connections; Use of lug angles; Concept of shear lag; Concept of splices and gusset plate.

UNIT III

8 Hrs.

Beams: Design of simple beams; Concept of web buckling and web crippling; Concept of laterally supported and laterally unsupported; Built-up beams; Design of plate girders.

UNIT IV

8 Hrs.

Compression Members: Design of single section and compound section of compression members; Design of Column; Design of laced and battened type columns; Design of footings for steel structures; Grillage foundation.

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BTCE604	DCC	Design of Steel Structures	60	20	20	30	60	2	1	2	4															

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UNIT V

9 Hrs.

Trusses and Industrial Frames: Roof and side coverings; Design of purlin and elements of truss; Design of industrial building frames and multistory frames,

Textbooks:

1. Limit State Design of Steel Structures by S K Duggal, McGraw Hill; 2nd edition, 2016
2. Comprehensive Design of Steel Structures -B.C Punmia, Laxmi Publications, 2015.
3. Design of Steel Structures – L.S. Negi, Tata McGraw-Hill Publishing Company

References:

1. Design and Analysis of Steel Structures- V.N. Vazirani & M.M. Ratwani, Khanna Publishers
2. Design of Steel Structures – S.S. Bhavikatti, I.K. International Publishing House Pvt. Limited, 2014

List of Experiments.

1. Detailed drawing of bolted and welded connection.
2. Design of tension members.
3. Design of simple and compound beams.
4. Design of plate girder.
5. Design of simple and built-up compound column with lacing and battens.
6. Design of various types of steel footings ex. slab base, gusseted base, grillage footing

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BTCE702	DCC	Estimating and Costing	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

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Course Educational Objectives (CEOs):

1. To inculcate the essentials of Civil Engineering field to the students of all branches of Engineering.
2. To provide the students knowledge regarding estimation of quantities involved in Civil Engineering works.

Course Outcomes (COs):

Students will be able to

1. Prepare rough and detailed estimate of buildings for different items.
2. Gain knowledge of specifications of different items of building.
3. Perform rate analysis of different work items.
4. Understand contracts, accounts and arbitration.

Syllabus

UNIT I **8 Hrs.**

Introduction: Purpose and importance of estimates; Principles of estimating; Types of estimates, plinth area rate, cubical content rate, preliminary, original, revised, and supplementary estimates, measurement sheet and abstract sheet.

UNIT II **8 Hrs.**

Analysis of rates: Various factors involved in the rate of an item, material and labour requirement for various trades; Preparation for rates of important items of work brick work, plain cement concrete and plastering; Bill of quantities (B.O.Q.); Schedule of rates. (S.O.R.)

UNIT III **9 Hrs.**

Detailed Estimates: Preparing detailed estimates of various types of buildings using long wall-short wall method and centre line method; Calculation for R.C.C. works for structural members like beam, column and slab; Bar bending schedule (B.B.S.)

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BTCE702	DCC	Estimating and Costing	60	20	20	30	20	2	1	2	4	

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UNIT IV

8 Hrs.

Specifications: Necessity of specification, types of specifications.

Contracts: Essentials of contracts, types of engineering contracts – advantages and disadvantages

Tenders: Tender forms, tender documents, and notices – time limits, necessity

UNIT V

9 Hrs.

Cost of Works: Factors affecting cost of work, overhead charges; Contingencies and work charge establishment; Preparation of DPR.

Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest; Methods of valuation; Rent fixation of buildings.

Text Books:

1. Estimation and Quantity Surveying Book, B N Dutta, UBS Publishers Distributors Pvt. Ltd; 28th Revised Edition (2016)
2. A Text Book of Estimating and Costing for Civil Engineering, G.S. Birdie, Dhanpat Rai Publishing Company Private Limited-New Delhi; Sixth edition (2014)
3. Estimating Costing and Valuation, S. C. Rangwala, Charotar Books Dist.-Anand (2017)

References:

1. Civil Engineering Estimating, Costing & Valuation, V. N. Vazirani, S. P. Chandola, Khanna Publishers 2010
2. Estimating, costing, specification & valuation in civil engineering, M Chakraborti, twenty ninth revised & enlarged edition (2006)
3. CPWD Specifications.

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BTCE702	DCC	Estimating and Costing	60	20	20	30	20	2	1	2	4

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List of Experiments.

1. Quantity take-off using different methods from CAD Drawings
2. Calculation of quantity of various items of works using MS Excel
3. Prepare the rate analysis using MS Excel
4. Prepare the cost of material and labour using MS Excel
5. Preparation of BBS for structural members
6. Preparation of DPR of Civil Engineering Project
7. Rent fixation of building.

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BTCE 605(1)	DSE	Traffic Engineering	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

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Course Educational Objectives (CEOs):

The aim of this course is to teach students about the traffic characteristic, traffic studies, intelligent transportation system and accidental studies in traffic engineering.

Course Outcomes (COs):

Student will be able to

1. Understand the traffic characteristics.
2. Perceive the knowledge about different studies involved in traffic engineering.
3. Get knowledge about component intelligent transport system.
4. Get knowledge about accident studies and mass transportation.

Syllabus

UNIT I

8 Hrs.

Traffic Characteristics: Road user's characteristics; Physical, mental and emotional factors; Factors affecting reaction time, PIEV theory; Vehicular characteristics- Characteristics affecting road design-width, height, length and other dimensions; Weight, power, speed; Braking capacity of a vehicle.

UNIT II

9 Hrs.

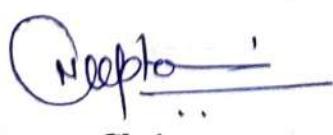
Traffic Studies: Spot Speed Studies and Volume Studies; Speed and Delay Studies; Origin and destination Studies (O & D), Various methods, collection and interpretation of data, planning and sampling; Traffic Capacity Studies- volume, density, capacity and level of service; Parking Studies- methods of parking studies cordon counts, space inventories, parking practices.

UNIT III

8 Hrs.

Introduction to Intelligent Transportation Systems (ITS) : Definition of ITS and Identification of ITS objectives; Historical background; Benefits of ITS - ITS data collection techniques – detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI); Geographic Information Systems (GIS); Video data collection.


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BTCE 605(1)	DSE	Traffic Engineering	60	20	20	30	20	2	1	2	4	

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UNIT IV

8 Hrs.

Traffic Operations and Control: Traffic regulations and various means of control; One way streets- advantages and limitations; Traffic signals- isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems; Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval; problems on single isolated traffic signal.

UNIT V

9 Hrs.

Accident Studies and Mass Transportation:

(A) Accident Studies: causes of accidents; Accident studies and records; Condition and collision diagram, Preventive measures, modern methods of road safety
 (B) Expressways, freeways and metro rail; Problems on mass transportation and remedial measures; Brief study of mass transportation available in the country

Text Books:

1. Principles of Transportation Engineering, Partha Chakraborty, and Animesh Das, PHI Learning, 2017, Second Edition.
2. Traffic Engineering and Transportation Planning, Kadiyali L.R., Khanna Publishers, 2011, Ninth Edition.

References:

1. Guidelines on Design and Installation of Road Traffic Signals, IRC:93, Indian Roads Congress, New Delhi, 1985.
2. Highway Capacity Manual, Transportation Research Board, Washington, DC, 2010.
3. Indian Highway Capacity Manual (INDO-HCM), Chandra, Satish, Gangopadhyay, S, Velmurugan, S, Ravinder, Kayitha, CSIR-CRRI, 2017.

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B.Tech. in Civil Engineering
(2021-2025)

COURSE CODE	CAT-EGO-RY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL			L	T	P
			END SEM	University Exam	Two Term Exam	Teachers Assessment*	END SEM	University Exam	Teachers Assessment*		
BTCE 605(1)	DSE	Traffic Engineering	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

List of Experiments.

1. Study of Road user characteristics
2. Traffic volume studies
3. Intersection volume studies
4. Small-network volume studies
5. OD volume studies
6. Study of traffic speed
7. Speed & delay studies
8. Travel-time studies
9. Accident studies

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BTCE 605 (2)	DSE	Air and Noise Pollution	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

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Course Educational Objectives (CEOs):

1. To provide a comprehensive overview of air and noise quality.
2. To understand the science and technology associated with the monitoring and control.

Course Outcomes (COs):

Students will be able

1. To acquire knowledge and understanding to evaluate air quality management and analyze the causes and effects of air pollution.
2. To identify the sources of air and noise pollution.
3. To understand the concepts involved in control technologies.

Syllabus

UNIT I **8 Hrs.**

Air pollution problem: Economics and social aspects; Historical episodes of air pollution; Sources of air pollution; Effects of air pollution on health, animal, plants, and materials.

UNIT II **9 Hrs.**

Role of meteorological condition; Properties of typical air pollutants; Air diffusion and Concentration of pollutants; General diseases caused by air pollutants; Toxicity of various pollutants; Plume patterns and height of chimneys; Atmospheric chemistry and formation of secondary pollutants.

UNIT III **9 Hrs.**

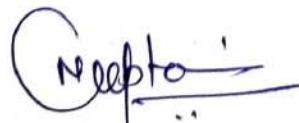
Sampling and Analyzing of Air Pollutants: Instrumental sampling of pollution; Standards of Air Pollution; Principle of air pollution control; Site selection and zoning; Introduction to various control methods, process, and equipment.

UNIT IV **9 Hrs.**

Air pollution control legislation; Public education; Status of air pollution control in various countries; Industrial Hygiene: Concept and importance; Factory involved in environmental hazards; Industrial ventilation occupational diseases; Control methods.

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UNIT V

10 Hrs.

Basics of acoustics and specification of sound; Sound power, sound intensity and sound pressure levels; Plane, point, line and multiple sources; Outdoor and indoor noise propagation; Psychoacoustics and noise criteria, effects of noise on health, Noise standards and limit values; Noise instrumentation and monitoring procedure.

Text Books:

1. Fundamentals of Air Pollutants – Raju, BSN Oxford & IBH Publishing Co. Pvt. Ltd., 2018.
2. Air Pollution- Rao M.N. & Rao HVN - Tata McGraw Hill.

References:

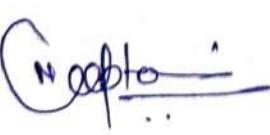
1. Air Pollution - Faith W.L, John Wiley & Sons.
2. Air Pollution - McCabe L.C., Mc. Graw Hill, International.
3. Air Pollution - Stern A.C., Academic Press N. York.

List of Experiments.

1. To study about the Ambient Air Quality standards.
2. To study the Air Sampling techniques.
3. To study about the Low and High-volume samplers.
4. To study the particulate pollution on roads using digital equipment.
5. To study the Indoor Air Quality (IAQ) and its monitoring.
6. Sampling of respirable particulate matter in the ambient and indoor environment.
7. To measure the ambient concentrations of particulate matter by using High Volume Sampler (HVS)


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