



Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Civil Engineering)

SEMESTER VI

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE601	DCS	WATER RESOURCES ENGINEERING	3	1	0	4	60	20	20	0	0

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

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

Course Objective

The students (A) shall be able to identify the surface and ground water resource and (B) make use of these resources efficiently & economically (C) according to condition and nature of work (D)

Course Outcomes:

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


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; Stream gauging; Run off and its estimation; Unit hydrograph derivation and application, S-curve hydrograph, synthetic unit hydrograph.

Unit - II

Floods: Types of floods and methods of estimation; Probability and frequency analysis; Flood routing through reservoirs and channels; Flood control measures; Economics of flood control

Unit-III

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, well construction, yield tests, specific capacity and specific yield; Advantages and disadvantages of well irrigation.


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Unit – IV

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


Canals and Structures: Types of canals; Canal alignment; Design of unlined and lined canals, 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.

Text Books:

1. Irrigation & Water Power 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, 1st edition(1976)
3. Engineering Hydrology; by K. Subramanya; Tata McGraw-Hill Education Pvt. Ltd, 4th edition (2013)

Reference Books:

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, 1st edition(1973)


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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE 602	DCS	STRUCTURAL ANALYSIS -II	3	1	0	4	60	20	20	0	0

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

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

Course Objectives:

1. To enable the student to have a good grasp of all the fundamental issues in these advanced topics in structural analysis.
2. To introduce the students to concept of structural stability and advanced methods in structural analysis.

Course Outcomes:

1. Analyze determinate and indeterminate structure with side sway.
2. Apply flexibility matrix to analyze any structure related to civil engineering works.
3. Apply stiffness matrix to analyze any structure related to civil engineering works.
4. Fundamentals of plastic analysis and use the same in practical applications.

Syllabus:

UNIT I

Sway Analysis: Moment Distribution method in analysis of frames with sway; Analysis of box frames; Analysis of portals with inclined members; Analysis of beams and frames by Kani's Method.

UNIT II


Approximate Methods for Lateral Loads: Analysis of tall frames, wind and earthquake loads; Codal provisions for lateral loads; Approximate analysis of multistoried frames for vertical and lateral loads.

UNIT III

Matrix Analysis (Flexibility Matrix): Introduction; Basic Concepts (Axis and Coordinates); Evaluation of flexibility matrix; Analysis of continuous beams using system approach.

UNIT IV

Matrix Analysis (Stiffness Method): Introduction; Basic Concepts (Axis and Coordinates); Evaluation of stiffness matrix; Analysis of Continuous Beams using system approach.


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UNIT V


Plastic Analysis: Introduction; Shape factor, load factor, Plastic hinge, Plastic analysis of beams and frames.

Text Books:

1. B.C Punamia, Ashok Jain., Theory of Structure, Laxmi Publication Delhi, 2017.
2. S. Ramammutham, Theory of Structure, Dhanpat Rai Publishing Company Private Limited-New Delhi; Ninth edition, 2014
3. S.S Bhavikatti, Structural Analysis, - Volume 1 and 2, Vikas Publishing House; Fourth edition, 2013
4. Structural Analysis - A Matrix Approach, by G Pandit , S. Gupta, McGraw Hill Education; 2 edition

Reference Books:

1. Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach, Chapman and Hall, New York, 2017
2. Wang C.K. Intermediate structural analysis, McGraw Hill, New York, 2017
3. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
4. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi, 2017
5. Norris C.H., Wilbur J.B. and Utkys. Elementary Structural Analysis, McGraw Hill International


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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE603	DCS	GEOTECHNICAL ENGINEERING-II	3	1	2	5	60	20	20	30	20

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

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

Course Objective:

1. To gain experience regarding the analysis and design of different foundations.
2. To provide an opportunity to learn how to identify ground condition.
3. To impart knowledge about the soil improvement techniques.

Course Outcomes:

1. To undertake design and analysis problem related to shallow foundation.
2. To undertake design and analysis problem related to deep foundation.
3. Identify ground conditions and suggest method of improvement.
4. Design and assess the degree of improvement.

Syllabus:

UNIT I

Shallow Foundations: 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, Balla, Skempton, Meyerhof and Hansan; Indian standard code for bearing capacity; Limits of total and differential settlements; Plateload test.


UNIT II

Deep 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

UNIT III

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 Stabilisation: Mechanical, lime, cement, bitumen, chemical, thermal, electrical stabilisation and stabilisation by grouting; Geo-synthetics, types, functions, materials and uses.


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UNIT IV

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

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, 2011.
2. Soil Mechanics and Foundation Engineering Dr. B. C. Punamia, Laxmi Publications, Delhi, 2010.
3. Geotechnical Engineering, C. Venkatramaiah –New Age International Publishers, Delhi, 2006

Reference Books:

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

List of Practicals:

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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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE604	DCS	DESIGN OF STEEL STRUCTURES	3	1	2	5	60	20	20	30	20

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

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

Course Objective

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.

Course Outcomes:

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

Syllabus:

UNIT I

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


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

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

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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UNIT V

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

Text Books:


1. Limit State Design of Steel Structures by S K Duggal, McGraw Hill; 2nd edition, 2016
2. Design of Steel Structures –B.C Punmia, Firewall Media, 1998
3. Design of Steel Structures – L.S. Negi, Tata McGraw-Hill Publishing Company

Reference Books:

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 Practical's:

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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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE605(1)	DCS	TRAFFIC ENGINEERING	2	1	2	4	60	20	20	30	20

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

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

Course Objectives:

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:

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

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

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

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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UNIT IV

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

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. Traffic Engineering and Transport Planning by L.R. Kadiyali, Khanna Publishers, Delhi, 1999
2. Traffic Engineering by Matson, W.S. Smith & F.W. Hurd, McGraw-Hill Book Company
3. Principles of Traffic Engineering, G.J. Pingnataro, McGraw-Hill.

Reference Books:

1. D.R. Drew, Traffic Flow Theory, McGraw-Hill
2. Wohl & Martin, Traffic System Analysis for Engineering & Planners, McGraw-Hill


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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCE605(2)	DCS	AIR AND NOISE POLLUTION	2	1	2	4	60	20	20	30	20

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 Objective

This course provides a comprehensive overview of air and noise quality and the science and technology associated with the monitoring and control

Course Outcomes:

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

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


Role of meteorological condition; properties of typical air pollutants; Air diffusion and Concentration pollutants; General diseases caused by air pollutants; Toxicity of various pollutants; Plumes patterns and height of chimneys; Atmospheric chemistry formation of secondary pollutants – PNN, PBN; Photolytic cycles; General diseases and toxicity of pollutants

Unit-III

Sampling and Analyzing of Air Pollutants: Instruments pollution survey; Standards of Air Pollution; Principle of air pollution control; Site selection and zoning; Various control methods, process and equipment changes; design and operation of various air pollution control equipments.

Unit-IV

Air pollution control legislation; Public education; Pollution standards; 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 Noise Pollution

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

Text Books:


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

Reference Books:

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 Practicals:

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 equipments.
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 gases and particulate matter by using High Volume Sampler (HVS).


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