



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in Light of NEP-2020
Diploma in Civil Engineering
(2021-2024)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTCE401	DCC	Concrete Technology	60	20	20	30	20	3	0	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.

Course Educational Objectives (CEOs):

1. To evaluate properties of cement, aggregate and water used in concrete.
2. To examine water/cement ratio & workability of Concrete.
3. To apply the knowledge of concrete technology in selecting special type of concrete.

Course Outcomes (COs):

The students will be able to

1. Analyse the properties of concrete.
2. Prepare concrete of required specification.
3. Select special concrete as per field application.

Syllabus

UNIT I

8 Hrs.

Introduction to Concrete, Ingredients of concrete; Cement-Types and properties; Aggregates-types and properties; Water-Role in concrete manufacturing and effect of quality of water on properties of Concrete.

UNIT II

9 Hrs.

Grades of Concrete; Water/Cement Ratio law and its importance in concrete technology, Guidelines for selection of water/cement ratio in preparation of concrete of various grades; Workability of fresh concrete-factors affecting, tests for determination of workability and its suggested values for different types of concrete work.

UNIT III

8 Hrs.

Properties of Hardened concrete with special emphasize on Strength, Durability, and Impermeability; Compressive strength test on concrete cubes of different ages and analysis of results; Non-destructive tests-basics of Rebound hammer test, Ultrasonic pulse velocity test.

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UNIT IV

8 Hrs.

Introduction of Concrete Mix Design as per IS Code. Manufacturing process of Concrete- Introduction to Batching, Mixing, Transportation, Placing, Compaction, Curing and Finishing of concrete. Different types of form work as per IS 456. Waterproofing-Importance and need of waterproofing, methods of waterproofing and materials used for waterproofing.

UNIT V

9 Hrs.

Admixtures in concrete: purpose and application for different types of admixtures- accelerating admixtures, retarding admixtures, water reducing admixtures, air entraining admixtures and super plasticizers. Special Concrete: Properties, advantages, and limitation of following types of Special concrete: ready mix concrete, Fiber-reinforced concrete, High performance concrete Self-compacting concrete and Light weight concrete, Cold weather concreting, Hot weather concreting.

Textbooks:

1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi, Fifth edition, 2017
2. Shetty, M.S., Concrete Technology, 2014 S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.
3. Mehta, P.K., Concrete: Microstructure, Properties, and Materials, McGraw Hill Education; Fourth edition, 2017

Reference Books:

1. IS 456 (2000): Plain and Reinforced Concrete - Code of Practice reaffirmed 2021.
2. IS 10262 (2009): Guidelines for concrete mix design proportioning
3. IS 383 (2016) : coarse and fine aggregate for concrete specification.
4. M.L. Gambhir, Building and Construction Materials: Testing and Quality control, M.L. Gambhir, McGraw Hill Education, 2017
5. Dr. R.P. Rethaliya, Concrete Technology, 2011 Charotar Publishing House

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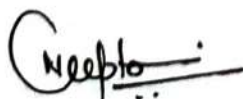
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List of Experiments.

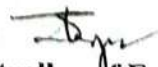
1. Determine fineness of cement by sieving.
2. Determine specific gravity, standard consistency, initial and final setting times of cement.
3. Determine compressive strength of cement.
4. Determine silt content in sand.
5. Determine bulking of sand.
6. Determine Fineness modulus of fine aggregate by sieve analysis.
7. Determine impact value of aggregate
8. Determine elongation and flakiness index of coarse aggregates
9. Determine workability of concrete by slump cone test.
10. Determine workability of concrete by compaction factor test.



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DTCE 402	DCC	Fluid Mechanics	60	20	20	30	20	3	0	2	4	

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Course Educational Objectives (CEOs):

1. To give fundamental knowledge of fluid, its properties and behavior under various conditions of internal and external flows.
2. To develop understanding about hydrostatic law, principle of buoyancy and stability of a floating body and application of mass, momentum and energy equation in fluid flow.

Course Outcomes (COs):

1. Understand the broad principles of fluid statics, kinematics and dynamics.
2. Understand definitions of the basic terms used in fluid mechanics.
3. Operation and understanding of various flow measuring devices.
4. Knowledge of performance and working of turbines and pumps

Syllabus

8 Hrs.

UNIT I

Properties of Fluid: Definition of fluid, Difference in behavior of fluid with respect to solids. Introduction to fluid mechanics and hydraulics, Branches of hydraulics- Hydrostatics and hydrodynamics, Physical properties of fluid - Mass density, Weight density, Specific volume, Specific gravity, Surface tension and capillarity, Compressibility, Viscosity, Newton's law of viscosity -Dynamic and kinematics viscosity. Ideal and Real liquids.

9 Hrs.

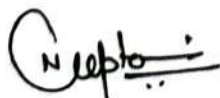
UNIT II

Hydrostatic Pressure: Free liquid surface, Definition of pressure and its SI unit, Hydrostatic pressure at point, Pascal's law, Pressure diagram. Total hydrostatic pressure and center of pressure, Numerical Problems.

Measurement of Liquid Pressure in Pipes: Concept of pressure head and its unit, Intensity of pressure, Variation of pressure with depth of liquid, Types of pressure- atmospheric gauge and absolute pressure. Piezometer, U-tube manometer, Bourdon's pressure gauge. Measurement of pressure difference using differential manometer - U tube differential manometer and inverted U-tube differential manometer.



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UNIT III

8 Hrs.

Fundamentals of Fluid Flow: Concept of flow, Gravity flow and pressure flow. Types of flow, Reynolds number and its application, Discharge and its units, Continuity equation for fluid flow, Bernoulli's theorem, its assumptions and limitations. Loss of head and modified Bernoulli's theorem. Application of Bernoulli's theorem.

Flow of Liquid Through Pipes: Loss of head due to friction, Darcy-Weisbach Equation Friction factor. Minor loss of head in pipe flow, Pipes in series and parallel, Equivalent pipe - Dupuit's equation. Hydraulic gradient line and Energy gradient line, Siphon pipe. Water hammer in pipes - cause effects and remedial measures, Numerical on head loss.

UNITIV

8 Hrs.

Flow Through Open Channel: Types of channels- artificial & natural, Different shapes of artificial channels. Geometrical properties of channel section, most economical channel section, Critical, sub-critical and supercritical flow in channel, Hydraulic jump and its uses.

Flow Measuring Devices: Velocity measuring devices for open channels. Pitot tube - principle, expression for velocity, current meter, Discharge measuring devices for channels- Notches and Weirs, Velocity area method for measurement of discharge through open channels. Discharge measuring devices for pipes: Venturi meter - Component parts, principle of working, Study and use of Water meter, Flow through orifice. Orifice- Definition and use, Types of Coefficients of contraction, coefficient of velocity and coefficient of discharge, Simple Numerical.

UNITY

9 Hrs.

Hydraulic Machines: Pumps - Definition and types. Suction head, delivery head, static head and manometric head. Centrifugal pump - component parts and their functions, principle of working, priming. Reciprocating pump - component parts and working. Submersible pump, Selection and choice of pump. Computation of power required for pumps. Turbines - Definition and types.

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1. Bansal R.K., Fluid Mechanics and Hydraulic Machines, Laxmi Publication, 2018
2. Rajput R.K., A Textbook of Fluid Mechanics and Hydraulic Machines Standard Book House 2017
3. Modi P.N. & S.M. Seth, Hydraulics and Fluid Mechanics Including Hydraulics Machines, Standard Book House 2019

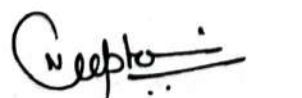
Reference Books:


1. Subramanya K., Fluid Mechanics and Hydraulic Machines, McGraw Hill Education (India) 2018
2. Garde R.J. and Miraigaoaker A.G. Engineering Fluid Mechanics, Scitech Publisher 2017
3. White, Fluid Mechanics McGraw Hill Education (India) 2017


List of Experiments.

1. Measurements of pressure and pressure head by Piezometer, U-tube manometer.
2. Measurement of pressure difference by U-tube differential manometer.
3. Study of bourdon's gauge.
4. Verification of Bernoulli's theorem.
5. Determination of type of Flow by Reynolds experiment.
6. Study of Hydraulic jump phenomenon.
7. Determination of coefficient of discharge for given rectangular or triangular notch.
8. Determination of coefficient of discharge for a given Venturi meter.
9. Determination of coefficient of discharge for a given Orifice meter.
10. Study & use of water meter.
11. Determination of performance characteristics of centrifugal and reciprocating pump.
12. Determination of performance characteristics of Pelton wheel turbine, Francis Turbine and Kaplan Turbine.


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DTCE 403	DCC	Theory of Structures	60	20	20	30	20	3	0	0	3	

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Course Educational Objectives (CEOs):

The objectives of the course are to build on the student's knowledge on the theory and application of structures in buildings and to introduce the students to concept of structural stability, methods in structural analysis

Course Outcomes (COs):

Student will able

1. To learn concept of eccentric loading and stresses in vertical members like columns
2. To analyze beams using various methods like slope deflection, three moment, and moment distribution
3. To understand different methods of finding axial forces in trusses.

Syllabus

UNIT-I

8 Hrs.

Direct and Bending Stresses in vertical members - Introduction to axial and eccentric loads, eccentricity about one principal axis only, nature of stresses; Maximum and minimum stresses, resultant stresses and distribution diagram; Condition for no tension or zero stress at extreme fiber, Limit of eccentricity, core of section for rectangular and circular cross sections, Middle third rule.

UNIT-II

9 Hrs.

Slope and Deflection - Concept of slope and deflection, stiffness of beams, Relation among bending moment, slope, deflection and radius of curvature, (no derivation); Double integration method to find slope and deflection of cantilever and simply supported beams subjected to concentrated load and uniformly distributed load on entire span; Macaulay's method for slope and deflection, application to cantilever and simply supported beam subjected to concentrated and uniformly distributed load on entire span.

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UNIT-III

8 Hrs.

Fixed and Continuous Beam - Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam over simply supported beam; Principle of superposition, Fixed end moments from first principle for beam subjected to point load, UDL over entire span; Application of standard formulae in finding end moments, end reactions and drawing S.F. and B.M. diagrams for a fixed beam; Definition, effect of continuity, nature of moments induced due to continuity, concept of deflected shape, practical examples; Clapeyron's theorem of three moment (no derivation), Application of Clapeyron's theorem maximum up to three spans and two unknown support moment only, Support at same level spans having same and uniform moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span; Drawing SF diagrams showing point of contraflexure, shear and BM diagrams showing net BM and point of contraflexure for continuous beams.

UNIT-IV

8 Hrs.

Moment distribution method - Introduction to moment distribution method, sign convention, Carry over factor, stiffness factor, distribution factor; Application of moment distribution method to various types of continuous beams subjected to concentrated loads and uniformly distributed load over entire span having same or different moment of inertia, supports at same level, up to three spans and two unknown support moments only; Introduction to portal frames - Symmetrical and unsymmetrical portal frames with the concept of Bays and stories.

UNIT-V

9 Hrs.

Simple trusses - Types of trusses (Simple, Fink, compound fink, French truss, pratt truss, Howe truss, Northlight truss, King post and Queen post truss); Calculate support reactions for trusses subjected to point loads at joints; Calculate forces in members of truss using Method of joints and Method of sections.

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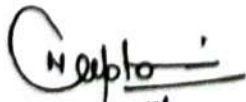
1. Ramamrutham.S, Theory of structures, Dhanpatrai & Sons.
2. Khurmi, R. S., Theory of Structures S. Chand and Co., New Delhi.
3. Bhavikatti S, Structural Analysis Vol-1, Vikas Publishing House Pvt Ltd. New Delhi.
4. Junnarkar, S. B., Mechanics of structures, Volume-I and II Charotar Publishing House, Anand.

Reference Books:

1. Pandit, G.S. and Gupta, S.P., Theory of Structures, Tata McGraw Hill, New Delhi.
2. Agor R, Structural Analysis, Khanna Publishing House, Delhi.


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Course Educational Objectives (CEOs):

The student shall be able to understand the concepts of Irrigation, Hydrology and Crop water requirements and perform Calculation and Analysis of associated hydraulics structure according to condition and nature of work.

Course Outcomes (COs):

1. Understand the concepts of irrigation, hydrologic data observation, processing, and analysis
2. Understand and calculate the water requirements of crops.
3. Identify and understand the working of various types of dams and their components.
4. Identify and understand the concepts of diversion head works and canal network.

Syllabus

UNIT I

8 Hrs.

Irrigation - Irrigation and irrigation engineering, advantages of irrigation, ill effects of over irrigation and types of irrigation project purpose wise and administrative wise, Methods of irrigation. Theory of reservoir and canal structure, weir and barrages, lift irrigation scheme, its suitability, advantages and limitations, Capacity of reservoir, Area Capacity curve, Introduction to Dams, Weir, Barrages.

UNIT II

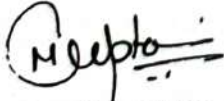
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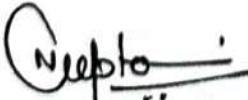
Hydrology - Hydrological cycle, Definition of rainfall, rain gauge and rain gauge station, types of rain gauges, average annual rain fall and its calculation, definition of run off, factor affecting run off, calculation of run off by run off by various methods.


UNIT III

8 Hrs.

Water Requirement of Crops- Cropping seasons and crop in Madhya Pradesh, Definition – Crop period, base period, Duty, Delta, factors affecting Duty, relation between Duty Delta and base period Definition – CCA, GCA, IA, intensity of irrigation time factor capacity factor. Crop rotation, Assessment of irrigation water


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Investigation and Reservoir Planning - Survey for irrigation project data collected for irrigation project. Area capacity curve, silting of reservoir, rate of silting, factors affecting silting, methods to control levels and respective storage in reservoir.

8 Hrs.

UNITIV

Dams and Spillways -Types of dams, Earthen dams and Gravity dams (masonry and concrete), construction and maintenance, Earthen Dams – Components and their function, typical cross section seepage through embankment and foundation seepage control through embankment and foundation. types of failure of earthen dams and remedial measures. Gravity Dams – Theoretical and practical profile, typical cross section, drainage gallery, joint in gravity dam, high dam and low dam, Spillways-Definition, function, location and components.

9 Hrs.

UNITV

Diversion Head Works - Weirs – components parts, unction and types, layout of diversion head works with its components and their function, canal head regular, silt excluders and silt ejectors. Barrages – components and their function. Difference between weir and barrage irrigation department standard design and specifications.


CANALS - Classification of canals according to alignment and position in the canal network. Canal lining – Definition, purpose, types of canal lining, advantages of canal lining, Introduction to Cross Drainage works, canal falls, escapes, cross regulators and canal outlets

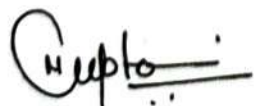
Text Books:

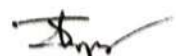
1. Punmia BC, Irrigation and Waterpower Engineering, Laxmi Publication (2021)
2. Garg S.K. Water Resources Engineering Irrigation Engineering & Hydraulic, Khanna Publishers (2017)
3. Asawa G.L. Irrigation and Water Resources Engineering, new age publishers (2015)

References Books:

1. Novak P. Hydraulic Structures, CRC Press 2012
2. Sharma S.K. Irrigation Engineering and Hydraulic Structures, S Chand Publication (2017)


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(2021-2024)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME									
			THEORY			PRACTICAL			L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*					
DTCE 405	DCC	Transportation Engineering	60	20	20	30	20	3	0	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.

Course Educational Objectives (CEOs):

1. To identify the types of roads, understand the geometrical design features and construction of different highways.
2. To identify the components of railways

Course Outcomes (COs):

After completing this course, student will be able to:

1. Identify the types of roads and Implementation of geometrical design features of different highways.
2. Describe the Construction Procedure of Bitumen and Concrete Roads and their properties
3. Identify the components of railway tracks and Get knowledge about various aspects of railways

Syllabus

UNIT I

7 Hrs.

Overview of Highway Engineering - Role of transportation in the development of nation, Scope and Importance of roads in India and its Characteristics; Jayakar committee recommendations; Different modes of transportation – land way, waterway, airway, Merits and demerits of roadway and railway; General classification of roads; Selection and factors affecting road alignment; Engineering surveys for highway location.

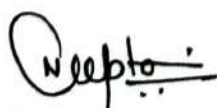
UNIT II

8 Hrs.


Geometric Design of Highway - Camber: Definition, purpose, types; Kerbs: Road margin, road formation, right of way; Design speed and various factors affecting design speed; Gradient: Definition, types as per IRC – Recommendations; Sight distance (SSD): Definition, types, simple numerical.; Super elevation: Definition, formula for calculating Super elevation; Extra widening of roads: numerical examples; Transition Curves: Necessity, formula for calculating simple numerical.


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UNIT III

9 Hrs.

Types of road materials and their properties- Subgrade soil; Pavement – Definition, Types, Structural Components of pavement and their functions; Construction of WBM road. Merits and demerits of WBM & WMM road; Construction of Flexible pavement / Bituminous Road, Types of Bitumen and its properties, Emulsion, Cutback, Tar, Terms used in BR-prime coat, tack coat, seal coat; Cement concrete road -methods of construction, Construction joints, filler and sealers; merits and demerits of concrete roads; Difference between rigid and flexible pavements.

UNIT IV

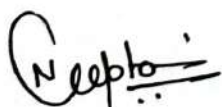
8 Hrs.

Basics of Railway Engineering: • Classification of Indian Railways, zones of Indian Railways; Permanent way: Ideal requirement, Components; Rail Gauge, types, factors affecting selection of a gauge; Rail, Rail Joints - requirements, types; Ballast - function and types, suitability; Creep of rail: causes and prevention; Sleepers - functions and Requirement, types - concrete sleepers and their density; Rail fixtures and fastenings – fish plate, spikes, bolts, keys, bearing plates, chairs- types of anchors and anti-creepers; Station -Purpose, requirement of railway station, important technical terms, types of railway station, factors affecting site selection for railway station.

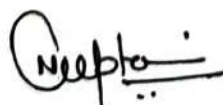
UNIT V

8 Hrs.

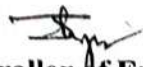
Track geometrics, Construction and Maintenance: Track Cross sections; Railway Track Geometrics: Gradient, curves- types and factors affecting, grade compensation; super elevation, limits of Super elevation on curves, cant deficiency, negative cant; coning of wheel, tilting of rail; Branching of Tracks, Points and crossings, Turn out- types, components, functions and inspection; diamond crossing; Station yard: Classification- Passenger, goods, locomotive and marshalling yards. Function & drawbacks of marshalling yards.



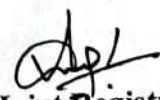
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Text Books:

1. Khanna S.K., Justo, C E G and Veeraragavan, A., Highway Engineering, Nem Chand and Brothers, Roorkee.
2. Birdi, Ahuja, Road, Railways, Bridge and Tunnel Engg , Standard Book House, New Delhi.
3. Sharma, S.K., Principles, Practice and Design of Highway Engineering,, S. Chand Publication, New Delhi.
4. Duggal, Ajay K. and Puri, V. P., Laboratory Manual in Highway Engineering, New Age International (P) Limited, Publishers, New Delhi.

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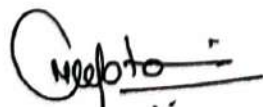
1. Arora, N. L., Transportation Engineering, Khanna Publishers, Delhi.
2. Saxena S C and Arora S P, A Textbook of Railway Engineering, Dhanpat Rai Publication.

List of Experiments.

1. Study of Los Angeles Abrasion Value of Aggregate.
2. Study of Impact Value of Aggregate.
3. Study of crushing strength of Aggregate.
4. Study of Flakiness Index of Aggregate.
5. Study of Elongation Index of Aggregate.
6. Study of Angularity Number of Aggregate.
7. Study of Ductility value of Bitumen
8. Study of Penetration Test of Bitumen
9. Study of Softening Point of Bitumen
10. Study of Flash and Fire point of Bitumen.


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