

K. D. K College of Engineering, Nagpur

Department of Civil Engineering

List of COs for session 2023-24

III Semester B. Tech Civil Engineering (CBCS)	
BTCVE301T	APPLIED MATHEMATICS - III
CO1	Apply Fourier series in the analysis of periodic functions not in terms sine and cosine encountered in engineering problems.
CO2	Solve Partial differential equations of first, higher and second order using elementary techniques; formulate mathematical models to simple problems of vibration of strings and beams in terms of Partial differential equations and solving with elementary solution techniques.
CO3	Learn the concept of finding maxima and minima of definite integral involving unknown function and its derivatives.
CO4	Learn Eigen value problem and its applications.
CO5	Learn to find an approximate solution of algebraic and transcendental equations, system of linear equations and first order ordinary differential equations by various numerical methods
CO6	Formulate simple optimization problem and learn to solve it by Graphical method and Simplex method.
BTCVE302T	FLUID MECHANICS
CO1	Understand the importance and practical significance of various fluid properties
CO2	Comprehend and estimate various forces acting partially or fully submerged bodies
CO3	Evaluate the importance of various parameter on the fluid motion
CO4	Know various flow measuring devices with their practical application
CO5	Illustrate the concept of impulse momentum principle, dimension analysis and model analysis of the fluid phenomenon
BTCVE302P	FLUID MECHANICS
CO1	Determine the discharge of Venturimeter , Orifice meter, Rectangular Notch, Triangular Notch
CO2	Estimate the coefficient of velocity and the coefficient of contraction of the orifice and mouth piece.
CO3	Assess and interpret the condition of laminar flow, turbulent flow & Reynolds number
BTCVE303T	SOLID MECHANICS
CO1	Understand the behaviour of materials under different stress and strain conditions.
CO2	Evaluate and draw shear force diagram and bending moment diagram and their relations
CO3	Formulate the bending and shear stresses equations and able to draw bending and shear stress diagram
CO4	Formulate slope and Deflection equations for beams subjected to various loads by Macauleys method
CO5	Analyze and Evaluate the torsion in circular section, Direct and Bending Stresses
BTCVE303P	SOLID MECHANICS
CO1	Demonstrate the understanding and application of various types of strain gauges.
CO2	Evaluate various engineering properties of different materials.
CO3	Obtain a graphical solution to SFD & BMD problems for simple beams.
BTCVE304T	GEOTECHNICAL ENGINEERING
CO1	Find the index and engineering properties of the Soil
CO2	Determine properties & demonstrate interaction between water and Soil
CO3	Analyze and compute principles of compaction and consolidation of soil
CO4	Ability to analyze to calculate bearing capacity, earth pressure and foundation settlement
CO5	Study and identify different type's natural materials like rocks & minerals and soil.

BTCVE304P	GEOTECHNICAL ENGINEERING
CO1	Analyze the fundamental principles of soil and Geotechnical Engineering associated with the analysis and design of geotechnical structures
CO2	Utilize and compute mathematical, analytical and numerical method to analyze geotechnical engineering problems
CO3	Determine the Index properties of soils.
CO4	Classification of soils.
CO5	Determination of Engineering Properties of soils.
BTCVE 30T	BUILDING CONSTRUCTION & ELEMENTARY BUILDING DRAWING
CO1	identity components of a building.
CO2	Differentiate and identify types of building materials
CO3	Select the appropriate material for building construction
CO4	Plan various construction related activities and their quality control
CO5	Know and identify latest techniques and material used.
BTCVE305P	BUILDING CONSTRUCTION & ELEMENTARY BUILDING DRAWING
CO1	Acquire the knowledge of building byelaws & building code
CO2	Apply the principles of building planning, design, and services; and draw submission/working drawing
CO3	Prepare the drawing of various building components
BTCVE306T	EFFECTIVE TECHNICAL COMMUNIIICATION
CO1	Identify the common errors in the sentences, transform sentences and articulate the meaning of idioms, phrases and proverb
CO2	Derive the meanings of synonyms/antonyms/analogies/technical jargon, etc
CO3	Write need-based official letters/notice/memo/circular/emails /applications, Draft a resume
CO4	Comprehend and analyze the various comprehension
CO5	Compile technical report/manual/project proposal, abstract of the proposal.

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IV Semester B. Tech Civil Engineering (CBCS)	
BTCVE401T	CONCRETE TECHNOLOGY
CO1	Think logically for development Concrete technology application in field OF Civil Engineering
CO2	Gain an experience in the implementation of Concrete Materials on Engineering concepts which are applied on Construction Fields
CO3	Understand the process of mix design of concrete.
CO4	Differentiate special concrete from conventional concrete.
CO5	Analyze causes of deterioration of concrete components
BTCVE402T	STRUCTURAL ANALYSIS
CO1	Apply knowledge to analyze determinate and indeterminate structures.
CO2	Apply knowledge to perform analysis of beams and frames using Slope Deflection Method and Moment Distribution Method.
CO3	Apply knowledge of Influence Line Diagram to analyze structural members for rolling loads.
CO4	Apply knowledge of Direct Stiffness Method to analyze Beams and Plane Frames.
CO5	Apply knowledge of Direct Stiffness Method to formulate Stiffness Matrix, Transformation Matrix, Load Matrix to analyze Plane Truss.
BTCVE402P	STRUCTURAL ANALYSIS - PRACTICAL
CO1	Apply the knowledge of different methods of analysis of structures to analyze the structural elements.
CO2	Analysis and design different structural components using application software
CO3	Adapt the appropriate method to develop the solution to engineering problems using software and modern tools.
BTCVE403T	ENVIRONMENTAL ENGINEERING
CO1	Have knowledge of characteristics of water, drinking water standards and necessity of treatment
CO2	Design various units of conventional water treatment plant
CO3	Understand the characteristics of wastewater, necessity of treatment, types of treatment processes
CO4	Equip with the basic knowledge related to design of waste water treatment
CO5	Understand of significance of air pollution, solid waste , climate change, geo environment etc
BTCVE403P	ENVIRONMENTAL ENGINEERING PRACTICAL
CO1	Perform different tests to ascertain physical, chemical and biological characteristic of given water sample.
CO2	Knowledge of the importance levels of BOD & COD in a waste water treatment and know various methods to determine the same.
CO3	Know and visualize the working of various units of Water Treatment Plant during the visit and can write a report.
BTCVE404T	TRANSPORTATION ENGINEERING
CO1	Define and describe different objectives and requirements of Highway Development and Planning, Alignments
CO2	Explain, Discriminate and Design various Geometric Features of Highways & Pavement Design
CO3	Understand, analyze, apply and evaluate the parameters of Traffic Engineering.
CO4	Explain and describe various terms in railway engineering and should be able to explain, discriminate and design various geometric features of railway track.
CO5	Understand the aircraft characteristics and terminal area functions. analyze and evaluate the basic runway length, orientation of runway

BTCVE404P	TRANSPORTATION ENGINEERING - PRACTICAL
CO1	Evaluate the strength parameters of sub-grade soil through various tests.
CO2	Examine different physical and engineering properties of road aggregates and bitumen & assess its suitability for different types of roads.
CO3	Carryout Road Safety Audit
BTCVE405T	SURVEYING AND GEOMATICS
CO1	Measure length and bearing of lines using various instruments and calculate area of given field.
CO2	Use the theodolite to measure angle and distances for traversing also identify and correct the errors in traverse. Design and lay-out the various types of curves.
CO3	To carry out levelling and contouring also able to determine volume of earthwork
CO4	Use modern instrument like Total work station, GPS, DGPS for surveying and able to prepare maps in CAD
CO5	Use Remote Sensing and Geographical Information System(GIS), UAV Drone and LiDAR Survey.
BTCVE405P	SURVEYING AND GEOMATICS - PRACTICAL
CO1	Exhibit the knowledge of working and uses of various survey instruments.
CO2	Take the measurement, record the measurement and perform the calculations by applying necessary adjustments.
CO3	Setting out of simple curves, computing height and area using various survey instruments.
BTCVE406P	MINI PROJECT
CO1	Conceptualize the mini project and propose research/ basic conceptual question with its theoretical background
CO2	Formulate the Aim and Objective of the project based on the basic questions raised
CO3	Present the project in a clear and distinct manner through different oral, written, analysis and design techniques.

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BTCVE501T	Hydraulics Engineering
CO1	Understand the concepts related to boundary layer theory and determination of drag and lift forces
CO2	Apply the knowledge of theories and equations of pipe flow in analyzing and designing the pipe network systems and to discuss effects of water hammer pressures.
CO3	Use the concepts of uniform and critical flow through open channels, design of efficient channel sections and application of specific energy concept.
CO4	Understand gradually varied flow analysis and its computation, and its application in open channel flow.
CO5	Understand and apply basics principles related to turbines & Pumps in water Resources planning
BTCVE501(P)	Hydraulics Engineering(P)
CO1	Verify basic terminology related to fluid mechanics.
CO2	Evaluate various hydraulic parameters for an open channel flow.
CO3	Explain the working and operation of turbines and pumps.
BTCVE502T	Reinforced Cement Concrete Designs
CO1	Understand the fundamental concepts of working stress method as per IS 456- 2000 and Pre-stressed concrete method.
CO2	Apply the fundamental concepts of limit state method on limit state of serviceability
CO3	Analyze the fundamental concepts of limit state of collapse in flexure, Shear & Bond as per IS 456-2000
CO4	Evaluate the fundamental concepts of limit state of collapse in compression and design of footing as per IS 456-2000.
CO5	Design of Simply supported Two-way slab
BTCVE 503T	Civil Engineering Materials, Testing and Evaluation
CO1	Evaluate the role of materials in Civil Engineering
CO2	Know the mechanical behavior and properties of steel and concrete by standard testing procedures for identifying their performance
CO3	Explain special materials, composite materials and use of new techniques in constructions for satisfying the future needs of industry.
CO4	Exposure to a variety of established material testing procedures/techniques and the relevant codes of practice
CO5	Evaluate and write a technical laboratory report.
BTCVE503P	Civil Engineering Materials, Testing and Evaluation
CO1	Ascertain the properties useful in production of good concrete and do the actual mix design of concrete
CO2	Evaluate the compressive strength of concrete & its variation.
CO3	Examine the quality of concrete by performing non-destructive testing of the existing concrete.
BTCVE504T	Professional Practice, Law & Ethics
CO1	Understand basic purpose of profession, professional ethics and various moral and social issues.
CO2	Analyze various moral issues and theories of moral development
CO3	Realize their roles of applying ethical principles at various professional levels
CO4	Identify their responsibilities for safety and risk benefit analysis.
CO5	Understand their constructive roles in dealing various global issues

BTCVE507P	Industrial Training & Professional Skill Training
CO1	Understand organizational skills & professional practices
CO2	Interpret the communication skills of organizational members with each other
CO3	Analyze the structural problems by using STADD.PRO
CO4	Design the structural members by using STADD.PRO
BTCVE508AU	Organizational Behavior
CO1	Understand the concept and importance of organizational behavior
CO2	Acquire the knowledge of interpersonal behavior and transaction analysis
CO3	Know different traits and theories of personality
CO4	Analyze the importance of motivation in organization and types of leadership
BTCVE505T	Elective – I (Advanced Structural Analysis)
CO1	Compute deflections in two dimensional structures using Strain energy method
CO2	Understand response of long columns
CO3	Use the approximate method for analysis of multi-storied frame structures
CO4	Understand Flexibility matrix method and application of column analogy
CO5	Understand the concepts related to structural dynamics & finite element method

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VI Semester B. Tech Civil Engineering (CBCS)

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BTCVE601T	Estimating and Costing
CO1	Prepare the preliminary estimate for administrative approval & technical sanction for a civil engineering project.
CO2	Write the specification of the works to be undertaken, prepare the tender documents, fill the contracts and make use of knowledge of different contract submission & opening in awarding the work to the contractor.
CO3	Use the concept of SD, EMD, MAS, Running Bill, Final Bill during the entire project
CO4	Use the technique of Rate analysis in estimating the exact cost of material & manpower and hence the entire project.
CO5	Estimate the bill of quantities using different techniques of preliminary & detailed estimation of buildings & roads & Arrive the exact value of the asset (movable & immovable) using different Valuation techniques
BTCVE601P	Estimating and Costing
CO1	Prepare preliminary estimates and detailed estimate of each item of the project using appropriate method and perform the rate analysis of materials and manpower to obtain exact cost of the project.
CO2	Make use of the knowledge in drafting the Specification, tender notice, contract proposal, etc and prepare the bill of quantities for the project.
CO3	Understand the term depreciation and methods of calculating it and make use of it in valuation of the building or commodity.
BTCVE602T	Construction Engineering and Management
CO1	Get themselves acquainted with various economic and managerial aspects of construction industry
CO2	Understand the tools and techniques of economic analysis for improving their decision making skills
CO3	Analyze the structure of market and effects of inflation with special reference to construction industry.
CO4	Understand the importance of marketing management and its effect on construction industry
CO5	Acquire financial acumen for construction business.
BTCVE603T	Water Resource Engineering
CO1	Understand occurrence, movement and distribution of water and estimate water abstractions, runoff and hydrographs
CO2	Illustrate different systems and methods of irrigation and estimate the quantity of water required by crops and estimate the quantity of water required by crops
CO3	Estimate reservoir capacity and analyze and design earth dams.
CO4	Design and analyze gravity dams and illustrate types of Spillways and energy dissipators.
CO5	Design unlined and lined channels and illustrate concepts of other irrigation structures.
BTCVE604T	Repairs & Rehabilitation of Civil Engineering Structures (Elective- III)
CO1	Explain deterioration of concrete in structures.
CO2	Carryout analysis using NDT and evaluate structures.
CO3	Assess failures and causes of failures in structures.
CO4	Carryout Physical evaluation and submit report on condition of the structure.
CO5	Carryout analysis of structures and take preventive action as per conditions & Requirement.
BTCVE605T	Environmental Engineering (Open Elective-I)
CO1	Explore the components of biosphere and impact of human activity on environment
CO2	Summarize the causes and sources of pollutants, and their impact on global environment.
CO3	Develop ethics and scientific awareness about waste generation and treatment.
CO4	Identify sources and types of wastes and its management
CO5	Understand noise, noise pollution and control.

BTCVE606P	Computer Aided Civil Engineering Drawing
CO1	Should be able Plan, Elevation, section and layout of Building in Auto CAD.
CO2	Should be able to prepare reinforcement detailing of Civil Engineering Structures specially foundation, slab, beam and staircase by using Auto CAD.
CO3	Should be able to prepare to submission drawing using Auto CAD.

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BTCVE701T	Design of Steel Structure
CO1	Use the knowledge of structural properties in assessing its strength and understand design philosophy.
CO2	Apply the knowledge of various techniques in analyzing and design the members subjected to axial loading.
CO3	Make use of knowledge of analysis in structural planning and design of various components of building subjected to bending.
CO4	Apply engineering concept to design members subjected to complex nature of loading.
CO5	Make use of knowledge to design footings.
BTCVE702T	Advance Soil Engineering (Elective IV)
CO1	Estimate the amount of consolidation and settlement and time required for settlement under a given load.
CO2	Understand the effects of seepage on the stability of structures and calculate stresses that influence soil behavior.
CO3	Ability to analyze the stability of natural slopes safety and sustainability of the slopes, design of retaining structures, reinforced earth wall, etc.
CO4	Understand basics principles of flow and soil permeability through porous media, Construct flow nets for water flow calculations.
CO5	Design deep foundation systems under different loading and soil conditions.
BTCVE703T	Air Pollution & Solid Waste Management (Elective-V)
CO1	Students will be able to understand different aspects of air pollutants, its sources and effects on man & materials and Meteorological parameters.
CO2	Students will be able to understand methods of air sampling & design equipments for air pollution to reduce its impact on environment.
CO3	Students will be able to understand problems arriving in handling large amount of solid waste generated.
CO4	Students will be able to understand problems arriving in its collection, transportation, and processing & to design safe collection and disposal methods.
CO5	Students will be able to learn emerging technologies for air pollution control.
BTCVE705T	Civil Engineering Materials, Testing and Evaluation (Open Elective-II)
CO1	Evaluate the role of materials in Civil Engineering
CO2	Know the mechanical behaviour and properties of steel and concrete by standard testing procedures for identifying their performance
CO3	Explain special materials, composite materials and use of new techniques in constructions for satisfying the future needs of industry.
CO4	Exposure to a variety of established material testing procedures/techniques and the relevant codes of practice.
CO5	Evaluate and write a technical laboratory report.
BTCVE706P	Project Work Phase-I
CO1	Understand organizational skills & professional practices.
CO2	Interpret the communication skills of organizational members with each other.
CO3	Collection of data for analyze/design the Civil Engineering problem by using appreciate methodology in a teamwork.

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VIII Semester B. Tech Civil Engineering (CBCS)	
BTCVE 801T	Construction Method and Equipment Management
CO1	Should have the knowledge about construction industry and construction projects
CO2	Should have knowledge about project organization.
CO3	Should have knowledge about construction planning methods.
CO4	Should have knowledge about construction labour and equipment management.
CO5	Should have knowledge about construction materials management.
BTCVE802T	Digital Land Surveying & Mapping
CO1	Know the basics of digital land surveying and its applications.
CO2	Handle the GPS for surveying and plot the details on map.
CO3	Know the use of DGPS and its applications and advantages.
CO4	Use total station for land surveying and plotting the details.
CO5	Use advance software for mapping.
BTCVE803T	Introduction to Civil Engineering Profession (Open Elective-III)
CO1	Know the scope in Different disciplines of civil engineering.
CO2	Should have knowledge of heritage buildings, highway engineering, Architecture.
CO3	Know the scope to develop the career in the field of Environmental Engineering such as Air Pollution, Water pollution, Scarcity of water etc.
CO4	Should have the knowledge of Automation and Robotics in Construction
CO5	Should have the knowledge of various Civil Engineering construction Materials.
BTCVE804P	Project Work Phase-II
CO1	Analyze or Design the Civil Engineering problems by using appreciate methodology in a team work.
CO2	Interpret the communication skills of team members
CO3	Use of Modern tools in the field of Civil Engineering