MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal, MP)

CIVIL ENGINEERING DEPARTMENT

Flexible Scheme: Course Outcomes (COs)

The course outcomes of the courses of **2018 admitted batch** from 1st year to 4th year of the undergraduate course of Civil Engineering Program are given below:

Courses		Course Outcomes
After the completion of this course, students will be able to:		
100205: Basic Civil Engineering & Mechanics	**CO1**	**Explain** concepts and terminologies of building materials, surveying and mechanics
	CO2	**Apply** various methods for surveying and mechanics
	CO3	**Determine** the location, area and volume of objects on ground surface
	CO4	**Solve** the problems of surveying and mechanics by using various methods
	CO5	**Analyse** the effects of system of forces on rigid bodies in static conditions
		100205: Basic Civil Engineering & Mechanics
100205: Basic Civil Engineering & Mechanics (P)	**CO1**	**Follow** the guidelines for field surveying.
	CO2	**Follow** the working principlesof survey instruments for measurements.
	CO3	**Measur**e the horizontal distances, difference in elevation and angles of various points
	CO4	**Detect** measurement errors and accordingly suggest corrections
	CO5	**Interpret** survey data and compute areas
		100205 (P) - BASIC CIVIL ENGINEERING AND MECHANICS LAB
110302: Building Planning & Design	**CO1**	**Explain** basics of building planning & design.
	CO2	**Illustrate** sustainability principle, by laws & characteristics of thermal and sound insulation in building planning & design.
	CO3	**Apply** sustainability concepts & principles in planning & design of buildings.
	CO4	**Evaluate** environmental, sustainable & safety aspects of a building.
	CO5	**Plan** different types of buildings as per by laws & codal provisions.
		110302: Building Planning & Design

110303: Building Materials & Construction	**CO1**	**Explain** the basic elements of buildings, engg. materials & construction.
	CO2	**Evaluate** the properties of various materials like cement, aggregate, concrete, admixture, brick , stone etc.
	CO3	**Distinguish** the suitability of building materials in the construction of elements of buildings.
	CO4	**Evaluate** various types of concrete in building construction accordingly.
	CO5	**Apply** various techniques for finishing & protection works of various elements of building.
		110303: Building Materials & Construction
110303 (P): Building Materials & Construction	**CO1**	**Determine** the properties of cement, sand & aggregate as per IS code
	CO2	**Determine** the workability of concrete for suitability of concrete mix in different construction works
	CO3	**Evaluate** compressive strength of various concrete mixes
	CO4	**Determine** physical properties of brick by experiment and practice accordingly
	CO5	**Examine** the properties of the cement mortar for various elements of the buildings
		110303 (P): Building Materials & Construction
110304: Surveying	**CO1**	**Explain** the techniques used for linear & angular measurements in surveying.
	CO2	**Analyse** different geodetic methods of survey such as triangulation, trignometric levelling, tachometry, photographic & GIS.
	CO3	**Apply** methods in control surveys.
	CO4	**Apply** tachometry in traverse computations.
	CO5	**Apply** various methods for setting curves, area & volume computations.
		110304: Surveying
110304 (P): Surveying	**CO1**	**Follow** the guidelines for field surveying
	CO2	**Follow** the working principles of survey instruments for measurements
	CO3	**Measure** horizontal & vertical angle by theodolite for traversing and levelling

	CO4	**Determine** tachometric constants for linear measurements by tacheometry
	CO5	**Create** a simple circular curve by using Rankine's method for alignment
		110304 (P): Surveying
110305: Strength of Materials	**CO1**	**Explain** the concepts of stress, strains, bending, deflection, buckling & torsion.
	CO2	**Explain** various theories for determining stress, buckling of columns & deflections of structures.
	CO3	**Apply** various theories for determining stress, buckling of columns & deflections of structures.
	CO4	**Evaluate** the stresses in bending, shear and torsion.
	CO5	**Analyze** various sections for stresses, strain, bending, torsion, buckling & deflections.
		110305: Strength of Materials
110305(P): Strength of Materials	**CO1**	**Evaluate** properties of material by impact test
	CO2	**Evaluate** properties of material by hardness test
	CO3	**Evaluate** properties of material by tensile test
	CO4	**Determine** compressive & flexural strength of materials
		110305(P): Strength of Materials
110306: Software Lab	**CO1**	**Attempt** to draw different components of a building
	CO2	**Produce** plan, elevation & section of various components of a residential and institutional building
	CO3	**Use** AutoCAD software in civil engineering drawing
	CO4	**Prepare** drawing sheets of various types of buildings like residential, institutional, commercial etc
		110306: Software Lab
110307: Self Learning / Presentation	**CO1**	**Analyze** contemporary issues in civil engineering & its allied areas through literature survey
	CO2	**Distinguish** state of art & relevance of the topic in national & international arena
	CO3	**Demonstrate** good oral & written communication skills
	CO4	**Develop** poster and power point presentations for effective communication
	CO5	**Display** lifelong learning
		110307: Self Learning / Presentation
110308: Summer	**CO1**	**Observe** various activities in field

Internship Project - I	**CO2**	**Examine** the utility of general and specific equipments for construction
	CO3	**Differentiate** the construction projects individually and in team
	CO4	**Develop** the writing and communication skills for various engineering problems
	CO5	**Adapt** lifelong learning for benefit of society
		110308: Summer Internship Project - I
110402: Geotechnical Engineering	**CO1**	**Evaluate** different properties of soil, types of foundations and its classifications
	CO2	**Examine** flow and shear parameters & their effects on various types of soil
	CO3	**Determine** the stress distribution & shear strength parameter of soil by various methods
	CO4	**Analyse** the stability of slopes, earth pressures & retaining walls using analytical methods
	CO5	**Evaluate** suitable foundation system for various site conditions.
		110402: Geotechnical Engineering – I
110402 (P): Geotechnical Engineering	**CO1**	**Check** physical properties of soil
	CO2	**Check** strength properties of soil
	CO3	**Differentiate** the flow properties and stresses of soil
	CO4	**Check** shear strength of soil
		110402 (P): Geotechnical Engineering – I
110403: Fluid Mechanics – I	**CO1**	**Define** various fluid properties & states of fluid
	CO2	**Apply** principles of fluid flow & dimensional analysis
	CO3	**Solve** fluid flow problems
	CO4	**Analyze** characteristics of fluid at rest, fluid at motion & dimensionless numbers
	CO5	**Discriminate** different types of fluid flow, measurement techniques & principles
	CO6	**Apply** the concepts of laminar flow in solving various fluid flow problems
		110403: Fluid Mechanics – I
110403 (P): Fluid Mechanics – I	**CO1**	**Differentiate** between different flow measurement devices
	CO2	**Notice** flow through pipes & fall velocity of particle
	CO3	**Correct** the instrumental errors

	CO4	**Apply** Stoke's law to calculate terminal velocity
		110403 (P): Fluid Mechanics – I
110404: Structural Analysis	**CO1**	**Classify** different type of structures based on support conditions
	CO2	**Explain** various methods & principles for analysis of structures
	CO3	**Apply** various methods & principles for structural analysis
	CO4	**Analyse** various structures using various methods, principles & theorems
	CO5	**Evaluate** different methods of structural analysis
		110404: Structural Analysis
110406: Water Resources Engineering	**CO1**	**Analyse various requirements for an efficient irrigation project**
	CO2	**Design different components of irrigation system using different theories**
	CO3	**Plan an efficient, economical & safe irrigation system**
	CO4	**Explain** the concept of hydrology and hydrograph
	CO5	**Apply** basic principles for measurement & forecasting of rainfall & runoff
	CO6	**Analyse** runoff hydrograph by various methods
		110406: Water Resources Engineering
110407: Survey Practice Lab	**CO1**	**Observe** topographical characteristics
	CO2	**Differentiate** methods to perform ground survey
	CO3	**Prepare** longitudinal & cross section profiles
	CO4	**Develop** contour map by using tachometer & total station
	CO5	**Prepare** the details of features using Plane table surveying
	CO6	**Produce** a simple circular curve by using Rankine's method for alignment
		110407: Survey Practice Lab
110501: Estimating Costing & Contracting	**CO1**	**Explain the fundamentals of quantity estimation, costing & contracting.**
	CO2	**Apply methods to estimate area, volume & cost.**
	CO3	**Evaluate mathematical & numerical models for rate & quantity estimation**
	CO4	**Determine rates & value**
	CO5	**Classify different rates of items, contracts & measurement techniques**
		110501: Estimating Costing & Contracting

110502: Structural Design & Drawing (R.C.C.)	**CO1**	**Apply the concepts of different design philosophies for deriving basic expressions used in RC design**
	CO2	**Determine the capacity of RC elements using IS456 guidelines.**
	CO3	**Analyze the RC elements for determining design variables as per IS456 & IS 875**
	CO4	**Design the RC elements as per IS 456 provisions.**
	CO5	**Develop the design sketches for RC elements as per IS456; IS13920 and SP34 provisions.**
		110502: Structural Design & Drawing (R.C.C.)
110503: Fluid Mechanics – II	**CO1**	**Differentiate different types of fluid flow & fluid machinery.**
	CO2	**Describe principles of analysis of fluid flow problem.**
	CO3	**Explain basic principles for measurement of different forces acting on fluid body.**
	CO4	**Analyse pipe flow, open channel flow problems & various characteristics of hydraulic machines.**
	CO5	**Design open & closed conduit systems.**
		110503: Fluid Mechanics – II
110503: Fluid Mechanics – II (P)	**CO1**	**Differentiate** between turbines & pumps
	CO2	**Select** the efficient turbines by studying the performance characteristics of various turbines
	CO3	**Distinguish** the performance characteristics of various pumps
		110503: Fluid Mechanics – II (P)
110505: Transportation Engineering	**CO1**	**Explain** the principles of highway planning & their geometrical design.
	CO2	**Evaluate** physical properties of suitable highway engineering materials with drainage provisions
	CO3	**Apply** the concepts of traffic engineering in transportation planning.
	CO4	**Design** pavements as per regulations.
	CO5	**Formulate** the layers of pavement along with provisions of its drainage & maintenance.
		110505: Transportation Engineering
110505: Transportation Engineering (P)	**CO1**	**Select suitable aggregate material by testing the physical properties**
	CO2	**Determine** properties of bitumen and its grade

	CO3	**Determine** CBR value of material for subgrade and subsequent layers of pavement.
	CO4	**Design** job mix formula for bituminous surface using Marshal Stability test.
		110505: Transportation Engineering (P)
110506: Minor Project – I	**CO1**	**Recognize** various engineering problems and techniques to solve them.
	CO2	**Reproduce** the solution of the problems upon the need of society.
	CO3	**Cooperate** to work within group.
	CO4	**Develop** the writing and communication skills for various engineering problems.
	CO5	**Display** lifelong learning.
		110506: Minor Project – I
110507: Summer Internship Project - II	**CO1**	**Develop the writing and communication skills for various engineering problems.**
	CO2	**Adapt lifelong learning for benefit of society.**
		110507: Summer Internship Project - II
110508: Self Learning Presentation	**CO1**	**Analyze** contemporary issues in civil engineering & its allied areas through literature survey
	CO2	**Distinguish** state of art & relevance of the topic in national & international arena
	CO3	**Demonstrate** good oral & written communication skills
	CO4	**Develop** poster and power point presentations for effective communication
	CO5	**Display** lifelong learning
		110508: Self Learning Presentation
110509: Environmental Engineering	**CO1**	**Explain the concepts of water supply and waste water engineering.**
	CO2	**Determine the requirements for safe supply of water and safe disposal of sewage.**
	CO3	**Apply suitable techniques for water & waste water treatment.**
	CO4	**Analyse a given water supply scheme and a given sewerage system.**
	CO5	**Design a water supply system based upon the needs of society and sewage system for safe disposal of sewage.**
		110509: Environmental Engineering

110509: Environmental Engineering (P)	**CO1**	**Follow** sampling procedure & other guidelines for sampling & analysis of water and wastewater samples.
	CO2	**Check** various water and waste water quality parameters.
	CO3	**Improve** the water and waste water quality by suggesting suitable corrective measures.
	CO4	**Train** others on various ways of improving the quality of water and waste water.
		110509: Environmental Engineering (P)
110602: Structural Design & Drawing (Steel)	**CO1**	**Explain** the principles of steel structural design using relevant IS Codes
	CO2	**Evaluate** structural behaviour of different steel structural elements
	CO3	**Analyse** a given section of steel structural element using IS codes
	CO4	**Design** different elements of steel structure under various loading conditions using relevant IS codes
	CO5	**Design** a structure/ component to meet desired needs within realistic constraints such as economy, safety, viable construction & its sustainability as per codal provisions
		110602: Structural Design & Drawing (Steel)
110607: Minor Project – II	**CO1**	**Recognize** various engineering problems and techniques to solve them
	CO2	**Reproduce** the solution of the problems upon the need of society
	CO3	**Cooperate** to work within group
	CO4	**Develop** the writing and communication skills for various engineering problems
	CO5	**Display** lifelong learning
		110607: Minor Project – II
100007: Disaster Management	**CO1**	**Identify** disaster prevention and mitigation approaches.
	CO2	**Classify** global and national disasters, their trends and profiles.
	CO3	**Determine** the impacts of various disasters.
	CO4	**Apply** Disaster Risk Reduction in management.
	CO5	**Infer** the linkage between disasters, environment and development.
		100007: Disaster Management

110612: Solid Waste Management	**CO1**	**Explain** the principles & concepts of waste management.
	CO2	**Apply** various techniques in collecting the waste.
	CO3	**Apply** various techniques of reducing the waste.
	CO4	**Apply** various techniques in disposal of waste.
	CO5	**Plan** an effective & efficient waste management system
		110612: Solid Waste Management
110613: Construction Planning & Management	**CO1**	**Explain** the concepts of construction planning & management process.
	CO2	**Describe** various techniques used in construction planning & management.
	CO3	**Apply** techniques of project planning & management.
	CO4	**Analyze** various problems of time & cost optimization using network techniques like CPM & PERT.
	CO5	**Plan** effectively for manpower & material management in a project along with suitable safety measures.
		110613: Construction Planning & Management
110614: Railways, Airport & Tunnel Engineering	**CO1**	**Explain the elements of airport planning, bridges & tunnels.**
	CO2	**Design runway & taxiway system as per regulations.**
	CO3	**Explain various elements of railway tracks, signalling, yards, bridges & tunnels.**
	CO4	**Illustrate various gauge, signals, fasteners, turnouts, crossing etc.**
	CO5	**Apply construction methods of railway tunnels.**
		110614: Railways, Airport & Tunnel Engineering
900117: Numerical Methods in Engineering	**CO1**	**Demonstrate** understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems
	CO2	**Apply** numerical methods to obtain approximate solutions to mathematical problems
	CO3	**Derive** numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations
	CO4	**Evaluate** the accuracy of common numerical methods & implement numerical methods in MATLAB.

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CIVIL ENGINEERING DEPARTMENT

		900117: Numerical Methods in Engineering
900118: Maintenance Management	**CO1**	**Identify** various services required in a building.
	CO2	**Carry** out planning of fire fighting system for a building.
	CO3	**Develop** a management strategy for maintenance of building services in a building.
	CO4	**Design** a sustainable building services plan for a building.
		900118: Maintenance Management
110701- Software Application for Solving Civil Engineering Problems	**CO1**	**Design** various beams, slabs & multistorey building's using various software's.
	CO2	**Design** water supply & sewer networks using various software's.
	CO3	**Practice** MS Excel in estimation works.
	CO4	**Produce** land use land cover maps and geo contour maps using various software's.
	CO5	**Practice** Primavera and MS-Project softwares.
		110701- Software Application for Solving Civil Engineering Problems
110702 - Summer Internship Project – III	**CO1**	**Observe** various activities of civil construction works.
	CO2	**Examine** the utility of general and specific equipments for construction.
	CO3	**Differentiate** the construction projects individually and in team.
	CO4	**Develop** the writing and communication skills for various engineering problems.
	CO5	**Adapt** lifelong learning for benefit of society.
		110702 - Summer Internship Project – III
110703 - Creative Problem Solving	**CO1**	**Identify** various on field problems.
	CO2	**Practice** various methods to solve problems.
	CO3	**Produce** solutions to various problems.
	CO4	**Demonstrate** various problems solving skills.
		110703 - Creative Problem Solving
110713: Advanced Structural Design- I (RCC)	**CO1**	**Explain behaviour of RCC and Prestressed concrete structures under loads.**
	CO2	**Determine forces developed in RCC and Prestressed concrete structures under loads.**
	CO3	**Compare designs of RCC and Prestressed concrete structures for given loadings.**

	CO4	Develop economic and safe designs of RCC and Prestressed concrete structures.
		110713: Advanced Structural Design- I (RCC)
110714: Hydraulic Structure	CO1	Identify different components of hydro project.
	CO2	Explain basic principles of designing hydropower plant & cross drainage works.
	CO3	Solve problems of dam analysis, energy dissipators & cross drainage works.
	CO4	Evaluate suitability of types of hydraulic structures.
	CO5	Design various elements of hydraulic structures.
		110714: Hydraulic Structure
110715-Advanced Structural Analysis	CO1	Determine response of structures by classical methods
	CO2	Use approximate methods for analysis of statically indeterminate structures
	CO3	Determine response of structures by matrix force method
	CO4	Evaluate and draw the influence lines for reactions, shears, and bending moments in beams and girders due to moving loads
	CO5	Model and analyze structural systems (building) with the aid of softwares
		110715-Advanced Structural Analysis
100008: Intellectual Property rights (IPR)	CO1	Imbibe the knowledge of Intellectual Property and its protection through various laws
	CO2	Apply the knowledge of IPR for professional development
	CO3	Develop a platform for protection and compliance of Intellectual Property Rights & knowledge
	CO4	Create awareness amidst academia and industry of IPR and Copyright compliance
	CO5	Deliver the purpose and function of IPR and patenting.
		100008: Intellectual Property rights (IPR)
900201- Integrated Waste Management for Smart City (OC - 2)	CO1	Explain the principles & concepts of waste management.
	CO2	Apply various techniques of handling the waste.
	CO3	Apply various techniques of energy recovery from waste.
	CO4	Plan an effective & efficient waste management system.
		900201- Integrated Waste Management for Smart City (OC - 2)
900202 - Project	CO1	Know the project planning and project network.

Planning & Control (OC - 2)	**CO2**	**Analyze** the network by CPM & PERT.
	CO3	**Analyze** the project using precedence network.
	CO4	**Analyze** the effect of resource planning on project.
	CO5	**Evaluate** the cost of project during planning.
		900202 - Project Planning & Control (OC - 2)
900213 - Urban Planning & Transportation Systems (OC - 3)	**CO1**	**Explain** the concepts for planning a city and land-use patterns.
	CO2	**Differentiate** various theories used in urban planning.
	CO3	**Analyse** various requirements for transportation systems.
	CO4	**Design** approaches in addressing the issues and concerns of urban environment through planning.
	CO5	**Plan** strategies for any project with an urban planning perspective as a member and/or leader in a team of planning projects.
		900213 - Urban Planning & Transportation Systems (OC - 3)
110801: Internship/ Project	**CO1**	**Observe various activities of civil engineering works.**
	CO2	**Recognize various engineering problems and techniques to solve them.**
	CO3	**Reproduce to solution of the problems upon the need of society.**
	CO4	**Develop the writing and communication skills for various engineering problems.**
	CO5	**Adapt lifelong learning for benefit of society.**
		110801: Internship/ Project