Scheme of Teaching and Examinations – 2026-2027

7th SEMESTER: CIVIL Engineering (CV)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BCV701	Estimation Costing And Contract management	IPCC	CVL	CVL	3	0	2	0	5	4	3	50	50	100
2	BCV702	Matrix Method of structural analysis	PCC	CVL	CVL	3	1	0	0	4	4	3	50	50	100
3	BCV 703	Infrastructure Engineering-[PEC-III]	PEC	CVL	CVL	3	0	0	0	3	3	3	50	50	100
4	BCV704	Open Elective	OEC			3	0	0	0	3	3	3	50	50	100
5	BCV 705	**Final Year Project Phase – II**	**Major Project**	CVL	CVL	0	0	0	12	12	6	3	50	50	200
6	BCV 706	**IKS**	AEC	CVL	CVL	1	0	0	0	1	0	3	50	50	100
					Total	**13**	**1**	**2**	**12**	**28**	**20**	**-**	**350**	**350**	**700**

8th SEMESTER: CIVIL Engineering (CV)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BCV 801	Industry Internship	INT	CVL	CVL	0	0	20	0	20	10	3	100	100	200
2	BCV 802	Capstone Project: Phase -3 [Publn + Patent	PROJ	CVL	CVL	3	0	8	0	8	4	3	100	---	100
					Total	**03**	**0**	**28**	**0**	**28**	**14**	**-**	**20**	**100**	**300**

PCC: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **MC**: Mandatory Course (Non-credit), **AEC**: Ability Enhancement Course, **SEC**: Skill Enhancement Course, **L:** Lecture, **T**: Tutorial, **P**: Practical **S= SDA**: Skill Development Activity, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Evaluation. K :This letter in the course code indicates common to all the stream of engineering.

ELECTIVE SUBJECTS: - VII Semester

PROFESSIONAL ELECTIVE COURSE [PEC]-I

Sl.No	Course Code	Course Name
1	BCV703A	Principles of Bridge Engineering
2	BCV703B	Repair & Rehabilitation of concrete structures
3	BCV703C	Transportation Engineering
4	BCV703D	Infrastructure Engineering

OPEN ELECTIVE [OEC] - I

Sl.No	Course Code	Course Name
1	BCV704A	Smart Natural Resources Conservation
2	BCV704B	AI Green Technology [Sustainable & green Solutions]
3	BCV704C	Disaster mitigation through AI
4	BCV704D	Intelligent Environmental Protection Management- Smart Way

ELECTIVE SUBJECTS: - VII & VIII Semester

PROFESSIONAL ELECTIVE COURSE [PEC]-III

Sl.No	Course Code	Course Name
1	BCV714	Ground Improvement Techniques
2	BCV724	Structural & Architectural forms in
3	BCV734	Disaster & work safety management
4	BCV744	Structural Masonry

OPEN ELECTIVE [OEC]-II

Sl.No	Course Code	Course Name
1	BCV715	AI & IOT enabled smart buildings
2		
3		
4		

Semester	**:**	**7th Semester**				
Course Title	**:**	**Estimation, Costing and Contracts Management**				
Course Code	**:**	**BCV701**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPPC**				
Stream	**:**	**CIVIL**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**3:1:3:0**		**SEE**	**:**	**50**
Total Hours	**:**			**SEE Duration**	**:**	**3 Hrs**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Estimate quantities of civil engineering works and prepare Bills of Quantities (BOQ) using conventional and basic digital tools.
2	Understand and apply specifications, rate analysis, and cost control techniques in construction projects.
3	Understand, apply and develop tender and contract documents including modern procurement practices.
4	Analyze post-contract issues such as delays, claims, disputes, and valuation of properties.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Program -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2026-27)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Quantity Estimation for Buildings** Study of various drawings attached with estimates, important terms, units of measurement, abstract of estimate, and types of estimates. Estimation of buildings using: • Long wall–short wall method • Centre line method Detailed quantity take-off for (including BBS) : • Substructure components (footings, foundations) • Superstructure components (columns, beams, slabs, lintels)	**8 Hours**
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies**	
2	**Estimation for Infrastructure Works** Estimation of: • Manholes and septic tanks Quantity estimation for roads: • Computation of earthwork in banking and cutting Introduction to cost control in construction projects • Concept of budget vs actual cost comparison • Basics of Earned Value Analysis (EVA) – BCWS, BCWP, ACWP (conceptual understanding) • Introduction to cash flow in construction projects (basic cash flow curves)	**8 Hours**
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies, Site Visits, Mini Project.**	
3	**Specifications, Rate Analysis and Cost Control** Specifications: • Objective and importance of specifications • Essentials of good specifications • General and detailed specifications for various building works Analysis of Rates: • Factors affecting cost of civil engineering works • Direct cost, indirect cost, and project cost • Rate analysis of items such as various building works Concept of Life Cycle Costing (LCC)	**8 Hours**
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies, Site Visits**	
4	**Contract Management – Tendering and Pre-Award Processes** Tender and its process: • Invitation to tender • Prequalification • Administrative approval and technical sanction • Bid submission and evaluation Contract formulation: • Letter of intent • Letter of acceptance • Notice to proceed Features/elements of standard tender documents: • PWD / CPWD / NHAI / International Competitive Bidding Law of Contracts: • Indian Contract Act, 1872 • Types of contracts • Joint ventures	**8 Hours**

	Contract forms: • FIDIC • CPWD, NHAI, NTPC, NHEPC Introduction to e-tendering and e-procurement systems Basics of risk allocation in construction contracts	
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies, Site Visits**	
5	**Contract Management – Post-Award, Claims and Valuation** Post-award contract management: • Performance security • Mobilization and equipment advances • Secured advance • Time for completion • Liquidated damages and bonus • Measurement and payment • Variations, deviations, and escalation • Breach of contract and termination Claims and dispute resolution: • Types of claims (time and cost) • Delays and compensation • Dispute resolution mechanisms Valuation: • Definitions and purpose of valuation • Cost, price, and value relationship • Capitalized value • Freehold and leasehold properties • Sinking fund and depreciation methods • Outgoings Methods of valuation: • Rent fixation • Valuation for mortgage • Valuation of land Arbitration process in construction disputes	**8 Hours**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Digital Quantity Take-Off from AutoCAD Drawings for Multistorey Building Projects	CO 4
2	Development of Automated Bill of Quantities (BOQ) Template Using MS Excel	CO 5
3	Preparation of Integrated Quantity Estimate and Bar Bending Schedule (BBS) for RCC Elements Using Spreadsheet Tools	CO 4
4	Parametric Earthwork Quantity Computation for Highway Projects Using Spreadsheet Techniques	CO 4
5	Comprehensive Rate Analysis of Civil Engineering Items Using Schedule of Rates (SoR) and Market Data	CO 5
6	Preparation of Detailed Cost Estimate for Building Projects Using Spreadsheet-Based Estimation Models	CO 5
7	Cash Flow Forecasting and Development of Project S-Curves Using MS Excel	CO 5
8	Tender Evaluation and Contractor Selection Using Weighted Scoring Models	CO 4
9	Analysis of Construction Delays and Quantification of Claims Using Case-Based Project Data	CO 4
10	Development of Earned Value Analysis (EVA) Model for Project Cost and Schedule Monitoring	CO 5
	Open ended Programs	
1	**Integrated Estimation and Cost Optimization of a Building Project** Preparation of a complete cost estimate and propose strategies to optimize project cost without compromising functionality.	CO 5
2	**Tender Analysis and Contractor Selection for a Construction Project** Evaluate multiple contractor bids for a given project and recommend the most suitable contractor based on technical and financial criteria.	CO 5
3	**Construction Delay Analysis and Claim Assessment** Analyze a delayed construction project and assess entitlement for time extension and cost claims.	CO 5

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Datta B.N., “Estimating and costing”, UBSPD Publishing House, New Delhi.
2	B.S. Patil, “Civil Engineering Contracts and Estimates”, Universities Press.
3	M. Chakraborthi; “Estimation, Costing and Specifications”, Laxmi Publications.
4	Rangwala, C. "Estimating, Costing and Valuation", Charotar Publishing House Pvt. Ltd., 2015
5.	Kohli D.D and Kohli R.C, “Estimating and Costing", 12 th Edition, S.Chand Publishers, 2014.
Reference Books	
1	Duncan Cartlidge , "Quantity Surveyor’s Pocket Book", Routledge Publishers, 2012.
2	Robert L Peurifoy , Garold D. Oberlender , “ Estimating Construction Costs” – 5ed , Tata McGraw-Hill , New Delhi
3	David Pratt, “Fundamentals of Construction Estimating” – 3ed, Edition
4	PWD Data Book, CPWD Schedule of Rates (SoR). and NH SoR – Karnataka FIDIC Contract forms.
5	MORTH Specification for Roads and Bridge Works – IRC New Delhi

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Explain the fundamental concepts of quantity estimation, specifications, rate analysis, tendering processes, contract provisions, and valuation methods, along with the basic use of tools such as AutoCAD drawings and MS Excel in construction estimation and management.	Understand/Remember	L1/L2
CO2	Apply principles of quantity take-off, specifications, rate analysis, tendering procedures, and valuation methods to prepare BOQ and cost estimates for building and infrastructure projects using conventional methods and basic software tools.	Apply	L3
CO3	Analyze construction project data including drawings, schedules, rates, and tender documents to evaluate quantities, costs, bid parameters, and contract conditions using spreadsheet-based models and standard schedules of rates.	Analyse	L4
CO4	Evaluate alternative estimation methods, contractor bids, cost components, and contract risks to support decision-making in project planning, tendering, and contract management.	Evaluate	L5
CO5	Develop integrated project deliverables including detailed estimates, BOQ, cash flow forecasts, tender evaluation reports, delay/claim analysis, and valuation summaries using appropriate tools and techniques.	Create	L6

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	2	1			3						3	1			
CO3	3		2		3						3	1	1		
CO4	2			2							3	1		1	
CO5	1	1									3	2			2

Weblinks and Video Lectures (e-Resources)	
1	https://youtu.be/GGikveOcaJw
2	https://youtu.be/ofkpm4lhJcg
3	https://www.youtube.com/watch?v=NlnxoQ-EVfc&list=PLDruByDs-j8EEgUrLEhktjk5nIWUvULsf
4	https://www.youtube.com/watch?v=h8Ufcvu0nKA
5	https://www.youtube.com/watch?v=3sbf4ew0rFY&list=PLKG5inUrVczMklUTdg5SiUIKZtshGRcbV

CIE- Continuous Internal Evaluation (50 Marks):

Bloom's Category	Theory				Practical 50 Marks
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember/ Understand	10	30			
Apply	10	10			
Analyze	10	10			10
Evaluate	20		20	20	20
Create			30	30	20

CIE Course Assessment Plan:

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5		10	10	10	40	0.4
CO2	5	5		5	5		20	0.2
CO3	10	10			10		20	0.2
CO4	10	10					20	0.2
CO5								
CCA								
CO4							40	0.4
CO5							60	0.6
Practical								
CO3							10	0.2
CO4							20	0.4
CO5							20	0.4

SEE- Semester End Examination (100 Marks):

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember & Understand	40
Apply	20
Analyse	20
Evaluate	20
Create	20

SEE Course Plan:

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10			10	10	30	30%
CO2	10	10	10			30	30%
CO3		10	10			20	20%
CO4		10	10			20	20%
CO5							

Semester	**:**	**7th SEM**				
Course Title	**:**	**MATRIX METHOD OF STRUCTURAL ANALYSIS**				
Course Code	**:**	**BCV702**				
Course Type (Theory/Practical/ Integrated)	**:**	**THEORY**				
Category	**:**	**PCC**				
Stream	**:**	**STRUCTURAL ENGINEERING**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**2:2:0:0**		**SEE**	**:**	**50**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3hrs**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**Classify** different structural forms, static and kinematic indeterminacy of structures
2	**Solve** for forces using element flexibility matrix and element stiffness matrix for continuous beams, rigid frames and trusses.
3	**Examine** forces using direct stiffness matrix in continuous beams, rigid frames and trusses.
4	**Investigate** temperature and lack of fit inside structural elements of existing building using software.
5	**Develop** different structural configuration for a proposed building and make a model of the best form.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction:** Structural systems, geometric and material non-linearity, principle of superposition, equilibrium and compatibility conditions, static and kinematic indeterminacy, principle of minimum potential energy and minimum complementary energy, concepts of stiffness and flexibility, flexibility and stiffness matrices of beam and truss elements.	8
Pedagogy	**Chalk and talk with demonstration using models,site visits and software to validate results**	
2	**Element Flexibility Method:** Force transformation matrix, global flexibility matrix, analysis of continuous beams, rigid frames and trusses.	8
Pedagogy	**Chalk and talk with demonstration using models,site visits and software to validate results**	
3	**Element Stiffness Method:** Displacement transformation matrix, global stiffness matrix, analysis of continuous beams, rigid frames and trusses.	8
Pedagogy	**Chalk and talk with demonstration using models,site visits and software to validate results**	
4	**Effects of Temperature Changes and Lack of Fit:** Displacement transformation matrix-Stiffness method, Force transformation matrix-Force method, Analysis of continuous beams, rigid frames and trusses.	8
Pedagogy	**Chalk and talk with demonstration using models,site visits and software to validate results**	
5	**Direct Stiffness Method:** Local and global coordinates systems, principle of contra gradience, global stiffness matrices of beam and truss elements, analysis of continuous beams and trusses.	8
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Weaver W and Gere J H, "Matrix Analysis of Framed Structures", CBS publications, New Delhi.
2	Rajasekaran S, "Computational Structural Mechanics", PHI, New Delhi.
3	Madhujit Mukhopadhay and Abdul Hamid Sheikh, "Matrix and Finite Element Analysis of Structures", Ane Books Pvt. Ltd.
Reference Books	
1	Godbole P N et.al, "Matrix Method of Structural Analysis", PHI ltd, New Delhi.
2	H C Martin, "Introduction to Matrix Methods in Structural Analysis", International textbook company, McGraw Hill.
3	Pundit and Gupta, "Theory of Structures Vol II", TMH publications, New Delhi

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Remember** and **understand** different structural forms and degrees of freedom to find forces and displacements using different concepts of mechanics.	Remembering Understanding	L1, L2
CO2	**Apply** element flexibility matrix and element stiffness matrix to solve for forces in continuous beams, rigid frames and trusses.	Applying	L3
CO3	**Analyze** forces using direct stiffness matrix in continuous beams, rigid frames and trusses.	Analyzing	L4
CO4	**Evaluate** demand and capacity of existing structures using structural software.	Evaluating	L5
CO5	**Create** different structural forms for a proposed building to model best configuration to withstand loads.	Creating	L6

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS
CO1															
CO2	3														
CO3		3												3	
CO4				3	3									3	
CO5			3									3	3		

Mapping of Course Outcomes to Program Outcomes:

Program Specific Outcomes

The Civil Engineering Graduate will be able to:

PSO1: Identify and resolve problems in providing basic needs of the society through sustainable infrastructural development by proper planning and execution.

PSO2: Perform analysis and design using advanced techniques in creating various civil engineering structures to meet global standards.

PSO3: Assess the properties of engineering materials and to explore the field conditions to provide useful data for analysis-design and recommendations for revision of codes.

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/105105166
2	https://nptel.ac.in/courses/105105109
3	https://nptel.ac.in/courses/105105166
4	https://nptel.ac.in/courses/105105109

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Theory**			
	Continuous Assessment Tests (IAT)		**Continuous Comprehensive Assessment (CCA)**	
	IAT-1	**IAT-2**	**CCA-1**	**CCA-2**
	50 Marks	**50 Marks**	**50 Marks**	**50 Marks**
Remember	-	-		
Understand	**10**	**10**		
Apply	**20**	**20**		
Analyze	**20**	**20**		
Evaluate			**50**	
Create				**50**

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5		5				10	10%
CO2	10	10		10	10	10	50	50%
CO3	10	10		10	10		40	40%
CO4								
CO5								
Total	25	20	5	20	20	10	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	-
Understand	20
Apply	30
Analyze	30
Evaluate	10
Create	10

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	5		5	5	25	25%
CO2	10	10	5	5	10	10	50	50%
CO3	5	5		5	5	5	25	25%
CO4								
CO5								
Total	20	20	10	10	20	20	100	100%

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2025-26)

Semester	**:**	**VII**				
Course Title	**:**	**Infrastructure Engineering**				
Course Code	**:**	**BCV 703**				
Course Type (Theory/ Practical/ Integrated)	**:**	**THEORY**				
Category	**:**	**PCC-1**				
Stream	**:**	**CIVIL**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:0:0**		**SEE**	**:**	**50**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3 Hrs**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**To introduce** the fundamental concepts and significance of Infrastructure And added needs in the present day fast growing world
2	**To familiarize** students with the different infrastructure projects, their uniqueness, basic requirements
3	**Equip** students to apply the knowledge of modern techniques towards eco-friendly, sustainable technologies in waste treatment, energy generation, mobility issues, last mile connectivity.
4	**To develop** the capability to understand & utilize available concreting techniques & their utility
5	**To provide** awareness on role of Pre stressing in Enhancing effectiveness, efficiency of Infrastructure works.

Teaching-Learning Process
Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

Scheme of Teaching and Examinations for BE Program -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1	***Infrastructure-*** Concept, Need [To meet urbanization] Essentials [Efficient, Sustainable]: Types: Developing countries aim for New; Developed countries aim for Renovation & modernization. ***Hard Infrastructure:*** Transportation Structures: Bridges, Fly overs: Types, basic technical requirements, Components,	**8**
Pedagogy	**Power point presentation, Chalk & talk, Seminar, Video demonstrations**	
2	***Hydraulic Structures***-Dams, Barrages, canals, lift irrigation system,: ***Energy Sector***- Eco friendly & green construction materials: Solar & wind mill: ***Environment Sector***- Water & waste water transportation And treating structures.	**8**
Pedagogy	**Power point presentation, Poster presentation, Think Pair and Share, Case Studies**	
3	***Soft Infrastructure:*** **Housing**: High rise, modern construction techniques-Prefab concept, **Hospitality**, **Education**, **Commercial establishments**, **Industrial hubs**, **Special economic zones**- Need, Essential requirements for sustainable & durable service. [Embracing digital advancements for enhancing / achieving project efficiency accuracy & time bound completion]: Concept of Smart City-taking Example of Songdo in South Korea And Masdar City in UAE: 3-D printing And modular constructions	**8**
Pedagogy	**Problem Solving, Video Demonstration, Case Studies**	
4	***Pre Stressing- Introduction & Concept*****:** Introduction to pre-stressed concrete structures: Concepts of Prestressing- Historical development of prestressing-Design Codes for Pre Stressed Structures- Advantages & Limitations of Pre-stressed Concrete Material - Need for High Strength Concrete- High Tension Steel. Types of Prestressing techniques.	**8**
Pedagogy	**Seminar, Poster presentation, Problem solving**	
5	***Pre Stressing- Types & Applications*****:** Introduction to Pre-stressing systems: Pre-Tensioning & Post Tensioning: Tensioning Devices: Pre & Post-Tensioning Devices: Anchorage Devices - Mechanical pre-stressing - Chemical Pre-stressing - Electrical Pre-stressing. ***Applications of Pre-stressing*****:** Bridges, Fly overs**,** Metro, pipes, Building components	**8**
Pedagogy	**Seminar, Site visit, Group discussion**	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book / Name of the author / Name of the publisher / Edition and Year**
1	**"Pre Stressed Concrete" N Krishna Rao: Mc.Graw Hill publications**
2	**"Pre Stressed Concrete" Dr. K U Muthu & Vijayanand: PHI Publications**
3	**"Pre Stressed Concrete" N Rajagopalan: Narosa Publications, Pune**
4	**"Pre Stressed Concrete Structures" Dayarathnam: CBS publication & Distributors**
5	**"Infra Structure Engineering" Dr. R P Rathaliya: Autul Prakashan, Ahmedabad**
	"Infra Structure Engineering" Dr. R K Lad, Mrs P.S Kulkarni: Niralai Prakashan
Reference Books	
1	**"Infra Structure Engineering And Construction Techniques" Dr. R K Lad, Mrs P.S Kulkarni: Niralai Prakashan**
2	**"Introduction to Infra Structure- CIVIL Engineering"** Michael R Penn & Philip J Parker: Willey Publication
3	**"Fundamentals of Infrastructure management" Donald Coffelt & Chris Hendrickson Carnegie Mellon University**

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** the fundamentals, importance, and scope of Infrastructure	**Understand**	**L1/L2**
CO2	**Apply** knowledge of different verticals in Infrastructure, their suitability	**Apply**	**L3**
CO3	**Analyze** scope of infrastructure, importance, providing proper ecofriendly & sustainable construction techniques as well materials	**Analyze**	**L4**
CO4	**Evaluate** Prestressing concept, its edge over conventional concreting	**Evaluate**	**L5**
CO5	**Design and adopt** a sustainable suitable prestressing techniques based on the field requirments.	**Create**	**L6**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS
CO1															**2**
CO2	**3**														**3**
CO3		**3**												**2**	
CO4				**3**				**2**	**2**	**2**				**2**	
CO5			**3**							**2**				**1**	

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/114106017
2	https://onlinecourses.nptel.ac.in/noc19_ch26/preview
3	https://onlinecourses.nptel.ac.in/noc19_ce40/preview
4	https://www.youtube.com/watch?v=Pt1EmJXyBVo
5	https://www.youtube.com/watch?v=fgjYoi_KNTs&t=1s

CIE- Continuous Internal Evaluation (50 Marks):

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	10	10		
Understand	10	10		
Apply	20	20		
Analyse	10	10		
Evaluate			25	25
Create			25	25

CIE Course Assessment Plan:

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	20	10	10	10	20	10	40	40
CO2	10	20	10	10	10	20	40	40
CO3	10	10			10	10	20	20
CO4								
CO5								
Total	40	40	20	20	40	40	100	100

SEE- Semester End Examination (50 Marks):

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	35
Understand	
Apply	35
Analyse	30
Evaluate	
Create	

SEE Course Plan:

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	14	14	7	7	14	14	70	35
CO2	14	14	7	7	14	14	70	35
CO3	12	12	6	6	12	12	60	30
CO4								
CO5								
Total	40	40	20	20	40	40	200	100

Semester	**:**	**7th**				
Course Title	**:**	**CONSERVATION OF NATURAL RESOURCES**				
Course Code	**:**	**BCV7**				
Course Type (Theory/ Practical/ Integrated)	**:**	**THEORY**				
Category	**:**	**OEC-**				
Stream	**:**	**CIVIL**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:0:0**		**SEE**	**:**	**50**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3 Hrs**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Describe the ecological and economic significance of land, water, air, and biodiversity resources.
2	Implement conservation practices for natural resources through case study analysis and sustainable strategies.
3	Examine the interrelated causes and impacts of soil degradation, air pollution, water scarcity, and biodiversity loss.
4	Assess the effectiveness of environmental policies, regulations, and technologies in promoting sustainability
5	Develop innovative models or strategies for mitigating global warming and conserving biodiversity.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Land:** Land as a resource, types of lands, conservation of land forms, deforestation, effect of land use changes. Soil health, ecological and economic importance of soil, impact of soil degradation on agriculture and food security, need for soil conservation,	8
Pedagogy	**Seminar, Group Discussion, Poster presentation, Problem Solving**	
2	**Water:** Global water resources, Indian water resources, Resources system planning. Water use sectors- domestic, industrial, agriculture. Water deficit and water surplus basins in India, equitable distribution, Inter-basin water transfers, Inter linking of rivers – Himalayan component, peninsular component, issues involved. Ground water, its potential in India, recharge of ground water. Contamination of ground water	8
Pedagogy	**Poster presentation, Think Pair and Share, Case Studies**	
3	**Air:** Introduction, composition, sources and classification of air pollutants, National Ambient Air quality standards (NAAQS), Air quality index, effects of air pollution on human health. Economic effects of air pollution. Control of air pollution by equipment, smoke and its control. Ozone depletion –impacts.	8
Pedagogy	**Problem Solving, Demonstration**	
4	**Biodiversity:** Introduction, Flora and Fauna, Importance of biodiversity. Economic values-medicinal plants, drugs, fisheries. Threat to biodiversity; natural & anthropogenic disturbance. Conservation of biodiversity: National parks, wild life sanctuaries, zoological gardens, gene banks, pollen culture. Ecosystem: Definition, Types: forest, grass land, marine, desert, wetlands, estuarine, lotic, lentic.. **AI-based Biodiversity Monitoring Systems**-Use of drones, satellite imagery, and machine learning for species tracking	8
Pedagogy	**Seminar, Poster presentation, Problem solving**	
5	**Global warming:** concept, indicators, factor and effects. Global climate change-indicators, health impacts, effect on biodiversity. Introduction to global efforts in conservation of biodiversity. .EIA regulations in India, status of EIA in India. Case study of hydro power/ thermal power projects **AI in Climate Change Prediction -**Use of AI for forecasting climate patterns	8

	Smart Environmental Monitoring Systems (IoT + AI) -Real-time pollution tracking and mitigation strategies	
Pedagogy	**Seminar, Poster presentation, Group discussion**	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	P.Jaya Rami Reddy, "A Textbook of Hydrology", University Science Press, New Delhi, 2011.
2	Krishnamurthy K.V., "An advanced textbook of Biodiversity- principle & practices." Oxford and IBH publications Co.Pvt ltd, New Delhi. 2004.
3	Odum, E.P., "Fundamentals of Ecology", W.B sounders, Philadelphia, USA, 1971
4	Singh J.S, Singh S.P & Gupta, S.R., "Ecology, environment and resource conservation", Anamaya publications, 2006
Reference Books	
1	Richard B. Primack, *"Essentials of Conservation Biology"*, Sinauer Associates, USA, 5th Edition, 2010.
2	G. Tyler Miller & Scott Spoolman, *"Environmental Science"*, Cengage Learning, 15th Edition, 2014.
3	Benny Joseph, *"Environmental Studies"*, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2nd Edition, 2009.
4	Basudeb Bhatta, *"Remote Sensing and GIS"*, Oxford University Press, New Delhi, 2nd Edition, 2011.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** the importance of land, water, air, and biodiversity resources, and their role in maintaining ecological and economic balance.	**Understand/Remember**	**L1/L2**
CO2	**Apply** the conservation practices for land, water, and biodiversity through case studies and sustainable resource management strategies.	**Apply**	**L3**
CO3	**Analyze** the causes and impacts of soil degradation, air pollution, water scarcity, and biodiversity loss, and interpret their interrelationships with environmental challenges.	**Analyse**	**L4**

CO4	**Evaluate** the effectiveness of environmental policies, regulations, and technologies in addressing resource	Evaluate	L5
CO5	**Create** an innovative solutions, models, or strategies for mitigating global warming, conserving biodiversity, and promoting sustainable development.	Create	L6

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															2
CO2	3														3
CO3		3												2	
CO4				3				2	2	2				2	
CO5			3							2				1	

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc24_hs160/preview?utm_source=chatgpt.com
2	https://onlinecourses.nptel.ac.in/noc21_ge16/preview?utm_source=chatgpt.com
3	NPTEL video lectures and YouTube videos.

CIE- Continuous Internal Evaluation (50 Marks):

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	10	10		
Understand	10	10		
Apply	20	20		
Analyse	10	10		
Evaluate			25	25
Create			25	25

CIE Course Assessment Plan:

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	20	10	10	10	20	10	40	40
CO2	10	20	10	10	10	20	40	40
CO3	10	10			10	10	20	20

CO4								
CO5								
Total	40	40	20	20	40	40	100	100

SEE- Semester End Examination (50 Marks):

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	35
Apply	35
Analyse	30
Evaluate	
Create	

SEE Course Plan:

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	14	14	7	7	14	14	70	35
CO2	14	14	7	7	14	14	70	35
CO3	12	12	6	6	12	12	60	30
CO4								
CO5								
Total	40	40	20	20	40	40	200	100

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

Semester	:	**VII**				
Course Title	:	**Green Technology**				
Course Code	:	**BCV 6xx / BCV6xx**				
Course Type (Theory/ Practical/ Integrated)	:	**THEORY**				
Category	:	**OEC-1**				
Stream	:	**CIVIL**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3 Hrs**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**To introduce** the fundamental concepts and significance of green technology in promoting environmental sustainability and resource conservation.
2	**To familiarize** students with the sources and impacts of air, water, soil, and solid waste pollution, and sustainable solutions through green engineering.
3	**To equip** students with the knowledge to apply eco-friendly technologies in waste management, energy generation, and pollution control.
4	**To develop** the capability to assess environmental problems and propose green alternatives using life cycle thinking and sustainable design.
5	**To provide** awareness of national and international environmental laws, policies, and green certification systems that govern sustainable practices.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction to Green Technology:** Definition, need and importance of Green Technology, Principles of Green Chemistry and Green Engineering, Sustainable development: goals and indicators, Life cycle analysis and eco-efficiency, Role of government and international bodies (UNEP, IPCC), AI for environmental data analysis and prediction of climate patterns, pollution monitoring, and intelligent decision-making for sustainable resource management.	8
Pedagogy	**Power point presentation, Chalk & talk, Seminar, Video demonstrations**	
2	**Renewable Energy Systems and AI Applications:** Solar energy: PV systems, solar thermal, applications, Wind energy: wind farms, offshore wind, small-scale systems, Biomass and biofuels, Hydropower, geothermal, and ocean energy, Energy storage and smart grid concepts. and application of Artificial Intelligence (AI) in energy forecasting, demand prediction, and smart energy management for efficient utilization of renewable resources.	8
Pedagogy	**Power point presentation, Poster presentation, Think Pair and Share, Case Studies**	
3	**Green Building and Waste Management:** Concepts of green buildings (LEED, GRIHA, IGBC standards), Smart materials and sustainable construction practices, Rainwater harvesting and water management, Solid waste management: reduce, reuse, recycle (3Rs), E-waste and hazardous waste management, AI for waste segregation, recycling optimization, and smart waste tracking.	8
Pedagogy	**Problem Solving, Video Demonstration, Case Studies**	
4	**Pollution Control and Environmental Remediation:** Air and water pollution: sources, effects and mitigation, Soil remediation and phytoremediation, Industrial ecology and cleaner production techniques, Carbon footprint and greenhouse gas mitigation strategies, Role of AI and IoT in environmental monitoring, AI-based air and water quality monitoring, predictive pollution modelling.	8
Pedagogy	**Seminar, Poster presentation, Problem solving**	
5	**Green Technologies in Industry and Innovation:** Case studies on green manufacturing and green supply chain, Eco-design and green product development, Nanotechnology in environmental applications, Green computing, paperless office, and digital transformation, role of IoT in environmental monitoring : policies, incentives and green entrepreneurship, application of Artificial Intelligence (AI) integrated with IoT for smart environmental systems	8
Pedagogy	**Seminar, Site visit, Group discussion**	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications	

	• **Demonstration:** exhibits the implementation process

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	William P. Cunningham & Mary Ann Cunningham, **Green Technologies: Concepts, Methodologies, Tools and Applications**, 8th Edition, 2014, *IGI Global, 2011, ISBN: 9781616928504.*
2	Benny Joseph, **Environmental Studies**, *McGraw Hill, Latest Edition 2017, ISBN: 9780070648268*
3	John Twidell & Tony Weir *Routledge* **, Renewable Energy Resources** by, *3rd Ed., 2015, ISBN: 9780415633581*
4	C.S. Rao**, Environmental Pollution Control Engineering**, *New Age International, 2nd Ed., 2006, ISBN: 9788122418354*
5	P. Leelakrishnan, *LexisNexis,* **Environmental Law** by*, 5th Ed., 2019, ISBN: 9789388548573.*
Reference Books	
1	Cunningham & Cunningham**, Principles of Environmental Science**, *McGraw Hill, 8th Ed., ISBN: 9781259095005*
2	Masters & Ela *Pearson***, Introduction to Environmental Engineering and Science**, *3rd Ed., 2008, ISBN: 9780131481930*
3	Wright & Boorse *Pearson* **Environmental Science: Towards a Sustainable Future**, *12th Ed., 2014, ISBN: 9781292026827*

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** the fundamental principles, importance, and interdisciplinary scope of green technology for achieving environmental sustainability.	Understand	L1/L2
CO2	Apply green engineering concepts and eco-friendly technologies to address environmental issues such as air, water, soil, and solid waste pollution	Apply	L3
CO3	**Analyze** environmental data, green material alternatives, and process flows to identify key areas for improvement in sustainability practices..	Analyze	L4
CO4	**Evaluate** renewable energy systems, waste management strategies, and green innovations for their feasibility, efficiency, and environmental impact..	Evaluate	L5
CO5	**Design** sustainable solutions, such as integrated green systems or cleaner production models, by incorporating life cycle analysis and green design	Create	L6

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															2
CO2	3														3
CO3		3												2	
CO4				3				2	2	2				2	
CO5			3							2				1	

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/114106017
2	https://onlinecourses.nptel.ac.in/noc19_ch26/preview
3	https://onlinecourses.nptel.ac.in/noc19_ce40/preview
4	https://www.youtube.com/watch?v=Pt1EmJXyBVo
5	https://www.youtube.com/watch?v=fgjYoi_KNTs&t=1s

CIE- Continuous Internal Evaluation (50 Marks):

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	10	10		
Understand	10	10		
Apply	20	20		
Analyse	10	10		
Evaluate			25	25
Create			25	25

CIE Course Assessment Plan:

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	20	10	10	10	20	10	40	40
CO2	10	20	10	10	10	20	40	40
CO3	10	10			10	10	20	20
CO4								
CO5								
Total	40	40	20	20	40	40	100	100

SEE- Semester End Examination (50 Marks):

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	35
Understand	
Apply	35
Analyse	30
Evaluate	
Create	

SEE Course Plan:

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	14	14	7	7	14	14	70	35

CO2	14	14	7	7	14	14	70	35
CO3	12	12	6	6	12	12	60	30
CO4								
CO5								
Total	40	40	20	20	40	40	200	100

Semester	:	**VII**				
Course Title	:	**DISASTER MITIGATION**				
Course Code	:					
Course Type	:	**THEORY**				
Category	:	**OEC-3**				
Stream	:	**Civil**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3 hours**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To understand the fundamental concepts of disaster, hazard, vulnerability, risk, and capacity and classification of various types of disasters, their causes, trends, and consequences.
2	To apply disaster management principles and techniques including mitigation strategies and disaster management cycle in real-life situations.
3	To analyze disaster management frameworks in India, including policies, institutional mechanisms, and roles of agencies.
4	To evaluate the technology-driven solutions, including AI-based applications for disaster prediction, preparedness, and response.

Teaching-Learning Process
Pedagogical Initiatives:
Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Understanding Disasters- Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, and disaster management	08
Pedagogy	Presentation, videos	
2	Types, Trends, Causes, Consequences and Control of Disasters- Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters	08
Pedagogy	Presentation, videos, Case studies	
3	Mitigation and Management techniques of Disaster- Basic principles of disasters management, Disaster Management cycle, Disaster management policy, National and State Bodies for Disaster Management, Early Warming Systems, Building design and construction in highly seismic zones, retrofitting of buildings.	08
Pedagogy	Presentation, videos, Case studies	
4	Disaster Management in India - Enhanced with AI Integration- Disaster Profile of India – Mega Disasters of India and Lessons Learnt, Disaster Management Act 2005 – Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter Governmental Agencies	08
Pedagogy	Presentation, videos, Case studies	
5	Applications of Science and Technology for Disaster Management with AI Focus- Geo-informatics in Disaster Management (RS, GIS, GPS and RS), Disaster Communication System (Early Warning and Its Dissemination), Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters, S&T Institutions for Disaster Management in India	08
Pedagogy	Presentation, videos, Case studies	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving	

	• **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2	Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
3	Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
4	Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
5	Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.
Reference Books/Materials	
1	Coppola D P, 2007. Introduction to International Disaster Management, Elsevier Science (B/H), London.
2	Manual on natural disaster management in India, M C Gupta, NIDM, New Delhi
3	An overview on natural & man-made disasters and their reduction, R K Bhandani, CSIR, New Delhi
4	World Disasters Report, 2009. International Federation of Red Cross and Red Crescent, Switzerland
5	Encyclopedia of disaster management, Vol I, II and IIIL Disaster management policy and administration, S L Goyal, Deep & Deep, New Delhi, 2006

Course Outcomes: At the end of the course, the student will be able to

CO	Course Outcomes	RBT Level
CO1	Understand the key disaster-related terms and concepts and differentiate various types of disasters and their impacts.	Understand/ Remember
CO2	Apply disaster mitigation and management strategies to solve practical problems.	Apply
CO3	Analyze disaster management policies, case studies, and institutional frameworks in India.	Analyze
CO4	Evaluate existing disaster management systems and develop innovative solutions using science, technology, and AI tools.	Evaluate

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	√	√		√		√	√					√	√		
CO3		√		√		√	√	√				√		√	√
CO4			√	√	√	√	√	√	√	√	√	√	√	√	√

Weblinks and Video Lectures (e-Resources)	
1	**Weblinks**: https://ndma.gov.in https://www.undrr.org https://www.preventionweb.net https://nidm.gov.in https://www.who.int https://mausam.imd.gov.in
2	**Video Lectures:** https://swayam.gov.in https://nptel.ac.in https://www.coursera.org
3	**e-Resources:** Prevention Web – Case studies, global reports Federal Emergency Management Agency – Practical guidelines Sphere Association – Disaster response standards

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	15	10		
Understand	15	10		
Apply	10	15		
Analyze	10	15		
Evaluate			25	25

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	15	15		10		10	50	50
CO2		10			15		25	25
CO3			10	15			25	25
CO4								
Total	15	25	10	25	15	10	100	100

SEE- Semester End Examination (100 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	25
Understand	25
Apply	25
Analyze	25
Evaluate	-

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	15	15		10		10	50	50
CO2		10			15		25	25
CO3			10	15			25	25
CO4								
Total	15	25	10	25	15	10	100	100

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**VI**				
Course Title	**:**	**Environmental Protection and Management**				
Course Code	**:**	**BCV6**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**				
Category	**:**	**Open elective**				
Stream	**:**			**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:2:0**		**SEE**	**:**	**100**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3hours**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**Understand** the fundamental concepts of environmental management, sustainability principles, and environmental policies at national and global levels.
2	Apply environmental standards, pollution control mechanisms, and the significance of cleaner production technologies.
3	**Interpret** the structure and requirements of Environmental Management Systems (EMS) such as ISO 14001.
4	**Analyze** environmental impacts, audit processes, and performance indicators for compliance and improvement.
5	**Apply** environmental management concepts to industrial sectors for pollution prevention and sustainable resource utilization.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2025-26

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Environmental Management Standards: Unique Characteristics of Environmental Problems - Systems approach to Corporate environmental management - Classification of Environmental Impact Reduction Efforts - Business Charter for Sustainable Production and Consumption – Tools, Business strategy drivers and Barriers - Evolution of Environmental Stewardship. Environmental Management Principles - National policies on environment, use of AI for Environmental Monitoring-case study.	8hrs
Pedagogy	Chalk and talk, videos, PowerPoint Presentation	
2	Environmental Management Objectives: Environmental quality objectives – Rationale of Environmental standards: Concentration and Mass standards, Effluent and stream standards, Emission and ambient standards, environmental performance evaluation: Indicators, benchmarking. Pollution control Vs Pollution Prevention - Opportunities and Barriers – Cleaner production and Clean technology, closing the loops, zero discharge technologies, AI in Cleaner Production- case study.	8hrs
Pedagogy	Chalk and talk, videos, PowerPoint Presentation	
3	Environmental Management System: EMAS, ISO 14000 - EMS as per ISO 14001– benefits and barriers of EMS – Concept of continual improvement and pollution prevention - environmental policy – initial environmental review – environmental aspect and impact analysis – legal and other requirements- objectives and targets – environmental management programs – structure and responsibility – training awareness and competence- communication – documentation and document control – operational control – monitoring and measurement – management review, Predictive Analytics in EMS- case study.	8hrs
Pedagogy	Chalk and talk, videos, PowerPoint Presentation	
4	Environmental Audit: Environmental management system audits as per ISO 19011- – Roles and qualifications of auditors - Environmental performance indicators and their evaluation – Nonconformance – Corrective and preventive actions - compliance audits – waste audits and waste minimization planning – Environmental statement (form V) - Due diligence audit, AI in Environmental Auditing and Anomaly Detection using Machine Learning- case study.	8hrs
Pedagogy	Chalk and talk, videos, PowerPoint Presentation,	

5	Applications: Applications of EMS, Waste Audits and Pollution Prevention Control: Textile, Sugar, Pulp & Paper, Electroplating, , Tanning industry. Hazardous Wastes - Classification, characteristics Treatment and Disposal Methods, Transboundary movement, disposal. AI in waste management and smart manufacturing- case study.	**8hrs**
Pedagogy	Chalk and talk, videos, PowerPoint Presentation,	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Christopher Sheldon and Mark Yoxon, !Installing Environmental management Systems a step by step guide" Earthscan Publications Ltd, London, 1999.
2	ISO 14001/14004: Environmental management systems Requirements and Guidelines International Organisation for Standardisation, 2004
3	Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations, Second Edition, NSF International, Ann Arbor, Michigan, January 2001.
Reference Books	
1	ISO 19011: 2002, !Guidelines for quality and/or Environmental Management System auditing, Bureau of Indian Standards, New Delhi, 2002
2	Paul L Bishop #Pollution Prevention: Fundamentals and Practice , McGraw- Hill International, Boston,2000.

Course Outcomes: At the end of the course, the student will be able to:

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	Understand environmental management principles, standards, policies, and regulatory frameworks.	Understand / Remember	L1/L2

CO2	Apply environmental standards, EMS procedures, and pollution control techniques in real-world scenarios.	Apply	L3
CO3	Analyze environmental impacts, audit results, and performance indicators to evaluate compliance and sustainability.	Analyse	L4
CO4	Design an Environmental Management System (EMS) framework or pollution prevention strategy for a given industry.	Evaluate	L5
CO5	Develop (create) innovative solutions, audit plans, or sustainable environmental strategies for industrial applications.	create	L6

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															1
CO2	3														2
CO3		3													1
CO4				3					2	2			2		
CO5						3				3				2	

Weblinks and Video Lectures (e-Resources)	
1	**https://youtu.be/fj79O9RSvcA**
2	**https://youtu.be/XGYbyI0xqmw**
3	**https://youtu.be/ID_gk0aSo0Y**
4	**https://nptel.ac.in/courses/120108004**

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	10	-			
Understand	10	10			
Apply	20	20			
Analyse	10	20			50
Evaluate	-	-	50	50	
Create	-	-			

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10					20	20%
CO2		10	10		10	10	40	40%
CO3		10		10	10	10	40	40%
CO4								
CO5								
Total	10	20	10	10	20	20		100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	20
Understand	20
Apply	40
Analyse	20
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10					20	20%
CO2			10		10	10	30	30%
CO3				10	10	10	30	30%
CO4					10	10	20	20%
CO5								
Total							100	100%