Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

DEPARTMENT OF CIVIL ENGINEERING

Affiliated to VTU
Approved by AICTE
Accredited by NAAC with A+ Grade
6 Programs Accredited by NBA
(CIVIL, CSE, ISE, ECE, EEE, MECH)

Scheme of Teaching and Examinations – 2025

5th 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	BCV501	Construction Management & Entrepreneurship	HSMS	CVL	CVL	3	0	0	0	3	3	3	50	50	100
2	BCV502	Design & drawing od RCC structural elements	IPCC	CVL	CVL	3	0	2	0	5	4	3	50	50	100
3	BCV 503	Waste Water Engineering	PCC	CVL	CVL	3	0	0	0	3	3	3	50	50	100
4	BCV 504	Software Application laboratory	PCCL	CVL	CVL	1	0	2	0	3	2	3	50	50	100
5	BCV 505	As per list of PEC-1	PEC-1	CVL	CVL	3	0	0	0	3	3	3	50	50	100
6	BCV 506	Extensive Survey Project	Mini Proj	CVL	CVL	0	0	0	2	3	2	3	50	50	100
7	BCV 507	Seismology & Fundamentals of Earthquake	AEC	CVL	CVL	2	1	0	0	3	3	3	50	50	100
8	BCV 508	Environmental Studies	MC	CVL	CVL	1	0	0	0	1	2	3	50	50	100
9		NSS / YOGA / PED	NCMC	CVL	CVL	0	0	2	0	2	0	0	100	-	100
					Total	16	2	6	2	26	22	-	500	400	800

ELECTIVE SUBJECTS: - V

PROFESSIONAL ELECTIVE COURSE [PEC]-I

Sl.No	Course Code	Course Name
1	BCV514	Principles of Bridge Engineering
2	BCV512	Repair And Rehabilitation of Structures
3	BCV534	Transportation Engineering
4	BCV544	Environmental Impact Assessment / Green & Energy Efficient buildings

Semester	**:**	**5th Semester**				
Course Title	**:**	**Construction Management & Entrepreneurship**				
Course Code	**:**	**BCV501**				
Course Type (Theory/ Practical/ Integrated)	**:**	**THEORY**				
Category	**:**	**HSMS**				
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 principles of construction project management**, including project categories, life cycles, feasibility analysis, and the roles and responsibilities of project managers.
2	**To develop an understanding of project planning and scheduling techniques**, including Work Breakdown Structures (WBS), sequencing, network diagrams, and critical path methods, with hands-on exposure to software tools like MS Project and Primavera.
3	**To familiarize students with the principles of resource and contract management**, covering labour productivity, equipment utilization, ownership costs, contract types, tendering processes, and legal documentation in construction projects.
4	**To promote awareness of procurement, construction safety, and risk management**, highlighting relevant standards, safety processes, sustainable procurement practices, risk identification and mitigation strategies in construction projects.
5	**To instil entrepreneurial thinking and business acumen**, enabling students to understand the journey of an entrepreneur, develop a business plan, conduct feasibility studies, and explore international business and venture capital opportunities.

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)**.

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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	**Project Planning and Scheduling** – Basic Concepts of Construction Management: Project Categories, Characteristics of Project, Types of Managers, Roles and Responsibilities of Project Manager, Project Lifecycle, Project Feasibility Reports. Project Planning – Need for Planning, Types of Plans, Project Scope, Stages of Planning. Project Scheduling – Need for Schedule, WBS, Sequencing and Dependency, Definition and Terms in Project Scheduling – Floats, Network diagram, Event, Activity, Interrelationships of events, Rules of Drawing networks, Fulkerson's Rule	**8 Hours**
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies**	
2	**Network Analysis, CPM and PERT –** Drawing of networks (AON and AOA), Calculations of critical path, floats of activities, PDM networking, crashing of activities, Baselines, Networking using Microsoft Project Primavera: Numerical and Examples.	**8 Hours**
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies, Site Visits, Mini Project.**	
3	**Resource and Contracts Management –** Resource Management: Basic Concepts, Class of Labour, Labour Productivity, Factors affecting labour output. Construction Equipment's: Classification of Construction Equipment's, Estimate Productivity for – Excavator, Dozer, Compactor, Grader and Dumper. Numerical Example on Ownership Cost, Operational and Maintenance Cost. Functions of Materials Management, Inventory Management Contracts Management: Definition of contract, Elements of contract, Types of contracts, Tendering process, Award of Contract, Documentation, Claims, Disputes, Breach of Contract, Project Completion, Project Closure.	**8 Hours**
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies, Site Visits**	
4	**Procurement Management, Construction Safety Management & Risk Management -** Procurement Management – Types of Procurement, Planning for Procurement, Procurement Execution, Sustainable Procurement Management. Construction Safety Management- OSHA, TQM, Safety and Environmental barriers to Quality Management, Safety Process for various construction activities, Safety and Health Codes in India, Fire Prevention and Control, Human Factors in Safety Management. Risk Management: Definition of Risk, Risk Identification, Risk Analysis, Risk Response and Strategy,	**8 Hours**
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies, Site Visits**	

5	**Entrepreneurship –** Characteristics of a successful Entrepreneur, Understand the entrepreneurial Journey, Styles of Entrepreneur, Personality Traits, Strengths, Weakness, 5M Model, Communications skill. Business Planning Process: Business Planning Process, marketing Plan, Financial Plan, Project Report and Feasibility Study, Guidelines for Preparation of Model Project Report for Starting a new Business, Introduction to International entrepreneurship opportunities, entry into international business, exporting, direct foreign investments, Venture Capital.	**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	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Raina V.K (1988) "Construction Management Practice" – Tata McGraw Hill Publishing Co Ltd.
2	Seetharaman S (1997) "Construction Engg. and Management" Umesh Publication
3	Vaid K N (1988) "Construction Safety Management" – National Institute of Construction Management, Mumbai
4	George Ritz (1994) "Total Construction Project Management" – McGraw Hill Inc.
5.	Chitkara. K.K. "Construction Project Management: Planning Scheduling and Control", Tata McGraw Hill Publishing Company, New Delhi, 2008. .
Reference Books	
1	Calin M. Popescu, Chotchal Charoenngam, "Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications", Wiley, New York, 2005.
2	Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders", Prentice Hall Pittsburgh, 2000
3	Moder, J., C. Phillips and E. Davis, "Project Management with CPM, PERT and Precedence Diagramming", Van Nostrand Reinhold Company, Third Edition, 2003.
4	Willis, E. M., "Scheduling Construction Projects", John Wiley & Sons, 2006.
5	Halpin, D. W. "Financial and Cost Concepts for Construction Management", John Wiley & Sons. New York, 2005.

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** the fundamental concepts of construction management, including project categories, project lifecycle, resource and equipment management, safety protocols, and entrepreneurship characteristics.	**Understand/Remember**	**L1**

CO2	**Apply** planning and scheduling tools such as WBS, network diagrams, CPM, and PERT to develop basic project schedules; use project management software like MS Project or Primavera to simulate real-time construction scenarios.	**Apply**	**L2**
CO3	**Analyse** construction projects by identifying dependencies, float, risk factors, resource productivity, types of contracts, and procurement strategies, to ensure effective project delivery.	**Analyse**	**L3**
CO4	**Evaluate** the feasibility of construction and entrepreneurial projects using project reports, contract elements, safety and risk assessments, and financial indicators for informed decision-making.	**Evaluate**	**L4**
CO5	**Design** a comprehensive construction or business project proposal integrating planning, scheduling, risk and safety management, and entrepreneurship principles, including financial, marketing, and operational aspects.	**Create**	**L5**

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	**3**				**2**						**3**			**1**	
CO3		**3**									**3**		**1**		**1**
CO4				**3**							**3**			**1**	
CO5			**3**							**1**	**3**	**2**			**1**

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=pwv1Nu3TO4A&list=PLWnoy5z_3BObBvFtBlowxM05D-q0VAWEs
2	https://www.youtube.com/watch?v=uWPIsaYpY7U
3	https://www.youtube.com/playlist?list=PLU6SqdYcYsfLQ8d6RKzlScfKlcinpNld4
4	https://www.youtube.com/watch?v=hzCa6fA4mfo
5	https://www.youtube.com/watch?v=eb3byH7hF5s

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	10	10		
Evaluate	10	10		
Create	--	--	20	20
Finance (PO11)	--	--	30	30

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		5	5		20	0.2
CO2	5	5	10	5	5	10	40	0.4
CO3			10			10	20	0.2
CO4		5	5		5	5	20	0.2
CO5	CCA							
Total							100	1.0

SEE- Semester End Examination (100 Marks):

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

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	20	20%
CO2		10	10	10	10		40	40%
CO3			5	5	5	5	20	20%
CO4			5	5	5	5	20	20%
CO5	CCA							
Total	5	15	20	20	25	15	100	

CURRICULUM DESIGN

CIVIL ENGINEERING

5TH SEMESTER

DRCSE

BCV502

Semester	:	**5th semester**				
Course Title	:	**Design of Reinforced Concrete Structural Elements**				
Course Code	:	**BCV502**				
Course Type (Theory/ Practical/ Integrated)	:	**Integrated**				
Category	:	**IPCC**				
Stream	:	**Structural Engineering**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**2:2:2:0**		**SEE**	:	**50**
Total Hours	:	**50**		**SEE Duration**	:	**3 hours**
Credits	:	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**Classify** structural elements and different loads on structures in accordance with IS456:2000.
2	**Utilize** IS456:2000 code provisions to find capacity of structural elements.
3	**Contrast** capacity with demands on components of structures withstanding actions by developing respective internal resisting forces.
4	**Investigate** forces on existing structural components of a building
5	**Develop** solutions in accordance with IS456:2000 code provisions

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 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction: Code IS456:2000** Introduction to working stress design and limit State Design: Philosophy and principle of limit state design with assumptions. Partial Safety factors for materials and loads. Stress block parameters for beams.	8
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies, Site Visits**	
2	**Limit State analysis of Beams:** Ultimate moment of resistance of singly reinforced, doubly reinforced and flanged beams subjected to flexure. Concept of balanced section, under reinforced and over reinforced section. Ultimate shear resistance of beams. **Limit State design of Beams:** Design of singly reinforced, doubly reinforced beams and flanged sections of beams for limit state of safety and serviceability. check for bending stress and shear stress. detailing of reinforcement, Bond stress, anchorage, development length and splicing. Limiting deflection, short term deflection and long term deflection.	8
Pedagogy	**NPTEL Lectures, Case Studies, Site Visits**	
3	**Limit State analysis and design of Slabs and Stairs**: Introduction to one way and two way slabs, Design of Cantilever, simply supported and one way continuous slab. Design of two way slabs for different boundary conditions. Design of dog legged and open well staircases. Detailing of reinforcement.	8
Pedagogy	**Chalk and Talk,Case Studies, Site Visits**	
4	**Limit State Design of Slabs and Stairs**: Introduction to one way and two way slabs, Design of Cantilever, simply supported and one way continuous slab. Design of two way slabs for different boundary conditions. Design of dog legged and open well staircases.	8
Pedagogy	**Chalk and Talk,PPT & Site Visits**	
5	**Limit State analysis and design Footings:** Design concepts of the footings and types. Design of isolated square and rectangular column footings with axial load and bending moment. Design of combined footings. Detailing of reinforcement	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	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Introduction to **Excel software** to prepare design excel sheet for iterative interaction with design for sustainable outcome.	
2	Ultimate moment of resistance of simply supported RCC singly reinforced beam using Excel and draw the reinforcement details using AutoCAD.	
3	Ultimate moment of resistance of RCC doubly reinforced beam using Excel and draw the reinforcement details using AutoCAD.	
4	Ultimate moment of resistance of flanged RCC beams using Excel and detailing drawing using AutoCAD.	
5	Ultimate shear resistance of beams using design excel sheet and detailing in AutoCAD	
6	Design of a continuous beam using Excel and detail the reinforcement using AutoCAD.	
7	Design a simply supported RCC one way slab with intermediate support and draw the reinforcement details	
8	Design a two-way slab for the given data and prepare Bar bending schedule	
9	Design a short axially loaded RC column using Excel	
10	Design the reinforcement for RCC square column with isolated square footing	
11	Design the reinforcement for RCC circular column with isolated square footing	
12	Design of deflection of beam using Excel and plotting of deflection profiles in excel	
Open ended Programs		
1	Preparing design excel sheet of existing building to investigate design capacity	
2	Preparing design excel sheet of existing building to investigate design demands	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Unnikrishnan Pillai and Devdas Menon, " Reinforced Concrete Design" , McGraw Hill, New Delhi
2	H J Shah, "Reinforced Concrete Vol. 1 (Elementary Reinforced Concrete)" , Charotar Publishing House Pvt. Ltd.
3	IS456-2000 Plain and Reinforced concrete-Code of practice
4	IS875-Part-1 and Part-2
5	SP-16 Design aids for reinforced concrete IS456-2000
Reference Books	
1	P C Varghese, "Limit State design of reinforced concrete", PHI, New Delhi
2	Robert Park and Thomas Paulay, "Reinforced Concrete Structures", John Wiley & Sons, Inc.
3	W H Mosley, R Husle, J H Bungey, "Reinforced Concrete Design", MacMillan Education, Palgrave publishers.

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** the provisions of IS456:2000 to design RCC structural elements	Remember & understand	L1 &L2
CO2	**Apply** IS456:2000 relevant clauses to determine ultimate resistance of structural elements subjected to direct stresses, bending stresses, shear stresses and torsional stresses	Apply	L3
CO3	**Analyze** different loads on structural elements to get required geometry to withstand actions with safety and serviceability till its intended design life.	Analyze	L4
CO4	**Investigate** existing buildings to prepare design excel sheets of demand and capacity	Evaluate	L5
CO5	**Create** structural skeleton of a G+3 residential building in accordance with IS456:2000 code provisions	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	3														
CO3		3										3	1		
CO4				3								3		1	
CO5			3		2	2	2					3			1

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/105105105
2	https://nptel.ac.in/courses/105104224
3	https://nptel.ac.in/courses/105105162
4	https://nptel.ac.in/courses/105105216

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					
Understand	10	10			
Apply	20	20			50
Analyse	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	20
Understand	30
Apply	30
Analyse	10
Evaluate	10
Create	20

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%

Wastewater Treatment Engineering

PCC Course – Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours Theory
Credits:	03
Theory - Each Module	8 Hrs
Practical's	8-10 Programs / Experiments
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

- The theory part of the PCC shall be evaluated both by CIE and SEE.
- The practical part shall be evaluated by only CIE (no SEE).
- However, questions from the practical part of IPCC shall be included in the SEE question paper.

Professional Core Course (PCC) - 3 Credit Course

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 (CIE) for the Theory component of the PCC (Maximum marks 50)

Internal Assessment Test (IAT):

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are 25 marks and that for the practical component is 25 marks.
- 25 marks for the theory component are split into 15 marks for two Internal Assessment Tests (Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive Assessment(CCA) methods.
- The first Internal test at the end of 40-50% coverage of the syllabus
- The second Internal test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Revised Blooms Taxonomy (RBT) Levels. Emphasis to be given for Higher order Thinking Skills(HOTS).

Semester End Examination (SEE) for PCC Theory

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

- The question paper will have ten questions. Each question is set for 20 marks.
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**
- 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. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored by the student shall be proportionally scaled down to 50 Marks.
- The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only.
- Questions mentioned in the SEE paper may include questions from the practical component.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be (CCA1+CCA2)/2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The Assessment will be through rubrics.
- CCA as project-based learning,
    - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
    - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

	• Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, • The assessment of these techniques shall be in rubrics. • The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

3 Credits Courses – Professional Core Course (PCC)

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory				**50**	----	----	**20**	
CIE	**Theory**	Internal Assessment Test (IAT) - I	Module – 1 to 2.5	50	(50+50) / 2	**15**	6	Average of Two Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
		CCA-2-Pedagogical Initiatives/ Activity based learning		50				
	Total CIE Theory					**25**	10	Scale down Marks of IAT and CCA to 25
SEE		Theory exam	Entire theory syllabus including questions from respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**V**				
Course Title	:	**Wastewater Treatment Engineering**				
Course Code	:	**BCV503**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:			**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:2:0**		**SEE**	:	**100**
Total Hours	:	**40+20**		**SEE Duration**	:	**3hours**
Credits	:	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To understand the various sources wastewater
2	To know the quality of the wastewater as per BIS effluent discharge standards
3	To identify the operational treatment units to treat the wastewater
4	To recognize the low-cost treatment system
5	To propose the need and methods of sewage treatment for rural and urban areas

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 -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	**Introduction to Waste water** Need for sanitation, Sources and types of wastewater, methods of sewage disposal, types of sewerage systems, dry weather flow, wet weather flow, factors effecting dry and wet weather flow on design of sewerage system, estimation of storm flow, time of concentration flow.	8hrs
Pedagogy	Chalk and talk, videos, PowerPoint Presentation, animations	
2	**Design of sewers** Hydraulic formula for velocity, effects of variation on velocity, regime velocity, design of hydraulic elements for circular sewers for full flow and partial flow conditions, material of sewers, shape of sewers, laying and testing of sewers, ventilation of sewers. Sewer appurtenances, manholes, catch basins, basic principles of house drainage, typical layout plan showing house drainage connections	8hrs
Pedagogy	Chalk and talk, videos, PowerPoint Presentation	
	Wastewater characterization and Primary treatment Sampling, significance and techniques, physical, chemical and biological characteristics, flow diagram for municipal waste water treatment, unit operations;	

3	screens, grit chambers, skimming tanks, equalization tanks, and sedimentation tank- design criteria and design examples.	**8hrs**
Pedagogy	Chalk and talk, videos, PowerPoint Presentation, animations	
4	**Secondary Treatment** Suspended growth and fixed film bio process, design of trickling filters, activated sludge process, sequential batch reactors, moving bed bio reactors, sludge digesters, sludge drying beds, low-cost waste treatment; oxidation pond, septic tank- design criteria and design examples.	**8hrs**
Pedagogy	Chalk and talk, videos, PowerPoint Presentation, animations, and visit to BWSSB water treatment plant	
5	**Sanitary fixtures** Different types of traps used in the building plumbing based on shape and locations. Sanitary efficient fixtures: Water closets-conventional and water efficient (low flush, dual flush, vacuum and water less), urinals – conventional and sensor-based water efficient/ waterless. Importance of grey water separation and reuse. Different types of plumbing system. Single stack, one pipe and two pipe systems. Drainage plan for a residential building	**8hrs**
Pedagogy	Chalk and talk, videos, PowerPoint Presentation, animations	
	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	"Wastewater Engineering: Treatment and Reuse": Metcalf & Eddy, Inc.; revised by George Tchobanoglous, Franklin L. Burton, H. David Stensel, McGraw Hill Education
2	"Environmental Engineering – Vol. II: Sewage Disposal and Air Pollution Engineering", S.K. Garg, Khanna Publishers
3	"Wastewater Engineering", B.C. Punmia, Ashok Jain, Arun Jain, Laxmi Publications
Reference Books	
1	Manual on sewerage and sewage treatment systems, Part A B and C Central publichealth and environmental engineering organization (CPHEEO), Ministry

	of urban development
2	Wastewater Treatment: Concepts and Design Approach: G.L. Karia and R.A. Christian PHI Learning Pvt. Ltd.
3	Guidelines on Sewerage and Sewage Treatment (MoHUA) – Ministry of Housing and Urban Affairs, India
4	Water and Wastewater Technology: Mark J. Hammer, Mark J. Hammer Jr., Pearson publication

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 various terms and concepts of wastewater, its sources and treatment	Understand / Remember	L1/L2
CO2	Apply standard methods to estimate wastewater quantities and analyze flow in sewer systems	Apply	L3
CO3	Analyse wastewater characteristics and treatment techniques required to treat.	Analyse	L4
CO4	Evaluate the suitability of different wastewater treatment technologies for various applications, including onsite and greywater systems.	Evaluate	L5
CO5	Design an integrated wastewater management plan	create	L5

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://www.youtube.com/results?search_query=Design+of+circular+sewer
2	https://www.youtube.com/watch?v=Lpuv_QxWvZY
3	https://www.youtube.com/watch?v=eH38OrP0CPA
4	NPTEL Links: https://www.youtube.com/watch?v=Lpuv_QxWvZY

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	-		
Understand	10	10		
Apply	20	20		
Analyse	10	20		
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%

Semester	**:**	**V**				
Course Title	**:**	**Software Application Lab**				
Course Code	**:**	**BCV504**				
Course Type **(Theory/ Practical/ Integrated)**	**:**	**Practical (LAB)**				
Category	**:**	**PCCL**				
Stream	**:**	**Civil**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**01:0:2:0**		**SEE**	**:**	**50**
Total Hours	**:**	**20**		**SEE Duration**	**:**	**03**
Credits	**:**	**02**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Use industry standard software in a professional set up.
2	Clear knowledge of finite element modelling, specification of loads and boundary condition in modelling the structure, analyzing and interpreting the results.
3	Visualize the behaviour of structure when subjected to loads for different boundary conditions
4	Achieve the skill sets to design and quantity estimation using software
5	Model a structure from plan and perform the analysis and design as per IS codal provisions

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)**.

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Software Introduction - Installation and basic commands	CO1
2	Analysis of Indeterminate beams using software	CO3
3	Analysis of Frames using software	CO3
4	Analysis of Truss using Software	CO3
5	Modelling and Analysis of an Industrial roof truss using software	CO3
6	Modelling and Analysis of multi-storeyed structure using software	CO3
7	Modelling and Analysis of a high-rise structure with multiple spans	CO3
8	Design of structural components in software	CO4
9	Design of foundation using software	CO4
10	Design of horizontal curve by offset method using excel	CO4
11	Design of super elevation using excel	CO4
12	Computation of earthwork excavation using excel	CO4
	Open ended Programs	
1	Creating a model of building and the effect of earthquake	CO5
2	Create a plan and set of structural drawings for a multi-storied building	CO5
3	Create a model of building and analyse for soil structure interaction	CO5

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	ETABS 2016 Black Book, Gaurav Verma, Matt Weber
2	Structural Analysis and Design of Tall Buildings, Bungale S. Taranath
Reference Books	
1	Users Guide - Etabs
2	Foundation Design Using SAFE Software, CSI SAFE official documentation
3	IS Codes: IS 456, IS 875, IS 800, IS 1893.

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

1. Have hold on the software & the library features:
2. Analyse the frames, truss.
3. Design given basic structural elements using ETABS
4. Develop professional approach towards calculating Earth work & foundation design

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the basic modes, drawing and modelling tools	**Understand/ Remember**	**L1**
CO2	Apply the knowledge of finite element modelling, specification of loads and boundary condition in modelling the structure, analyzing and interpreting the results.	**Apply**	**L2**
CO3	Analyze the given structure element for different load combinations, load patterns and boundary conditions	**Analyze**	**L3**
CO4	Design the given structure and tabulate the results.	**Design**	**L4**
CO5	Create a structure from plan and perform design and analysis as per IS specification	**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	√				√									√	
CO3		√			√			√						√	
CO4			√		√			√						√	
CO5				√	√			√						√	

Web links and Video Lectures (e-Resources)	
1	Etabs introduction video: https://www.youtube.com/watch?v=pUZTPv1TyjI
2	Etabs tutorial for RCC design: https://www.youtube.com/watch?v=WITGMxs2x68
3	Foundation design in safe: https://www.youtube.com/watch?v=SLbitx4hgCc

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 (CIE):

CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40. Total marks scored by the students for record are scaled down to 30 marks (60% of maximum marks). The suitable rubrics can be designed to evaluate each student's performance and learning ability. The marks scored in test shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Examination:
SEE will be conducted by University as per the scheduled timetable in cad laboratory in batches, with common question papers for each batch. The question paper shall be set for 100 marks. The medium of the question paper shall be English. The duration of SEE is 03 hours. The question paper will have two parts. Part A will have questions from analysis and application s in excel. Part B will have questions from design. The students have to answer one full question out of two full questions from each part.

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				

Apply				
Analyse				
Evaluate				
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								
CO2								
CO3								
CO4								
CO5								
Total								

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	
Apply	
Analyse	
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								
CO2								
CO3								
CO4								
CO5								
Total								

Semester	**:**	**5th SEM**			
Course Title	**:**	**Transportation Engineering - II**			
Course Code	**:**	**BCV534**			
Course Type (Theory/Practical/ Integrated)	**:**	**THEORY**			
Category	**:**	**PEC**			
Stream	**:**	**HIGHWAY ENGINEERING**	**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**2:2:0:0**	**SEE**	**:**	**50**
Total Hours	**:**	**50**	**SEE Duration**	**:**	**3hrs**
Credits	**:**	**3**			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Comprehend the principles and components of railway, airport, harbor, and tunnel engineering.
2	Apply geometric design principles to transportation infrastructures.
3	Utilize modern technologies, including Artificial Intelligence (AI), in transportation planning and management.
4	Analyze and design transportation systems considering safety, sustainability, and efficiency.
5	Evaluate the integration of multimodal transportation systems in urban planning.

Teaching-Learning Process

Pedagogical Initiatives:

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- 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.
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- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
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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	**Module 1: Railway Engineering (8 Hours)** • Introduction to railways and their role in transportation. • Permanent way components: rails, sleepers, ballast, and subgrade. • Track geometry: gauges, coning of wheels, tilting of rails. • Track stresses and maintenance practices. • Introduction to AI applications in railway maintenance and operations.	8
Pedagogy	**Chalk and talk with demonstration using models, site visits and software to validate results**	
2	**Module 2: Airport Engineering (8 Hours)** • Airport planning and site selection criteria. • Runway and taxiway design: orientation, length calculations, and geometric design. • Visual aids: markings, lighting systems, and Instrument Landing Systems (ILS). • Integration of AI in air traffic management and airport operations	8
Pedagogy	**Chalk and talk with demonstration using models, site visits and software to validate results**	

3	**Module 3: Harbor and Dock Engineering (8 Hours)** • Classification and planning of harbours. • Design of harbor components: breakwaters, wharfs, jetties, and piers. • Dock structures: dry docks, wet docks, and slipways. • Navigational aids and their significance. • Use of AI in port operations and logistics management.	**8**
Pedagogy	**Chalk and talk with demonstration using models, site visits and software to validate results**	
4	**Module 4: Tunnel Engineering (8 Hours)** • Introduction to tunnelling and its applications. • Tunnel alignment, surveying, and transferring of centreline. • Tunnelling methods in soft soils and hard rocks. • Tunnel lining, ventilation, and safety measures. • Application of AI in tunnel construction and monitoring	**8**
Pedagogy	**Chalk and talk with demonstration using models, site visits and software to validate results**	
5	**Module 5: Modern Trends in Transportation Engineering (8 Hours)** • Smart transportation systems and Intelligent Transportation Systems (ITS). • Integration of AI, IoT, and Big Data in transportation. • Sustainable transportation planning and green logistics. • Case studies on AI applications in traffic management and infrastructure maintenance. • Future trends: autonomous vehicles and hyperloop technology.	**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	

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Saxena Subhash C and Satyapal Arora, "A Course in R ailway Engineering", Dhanpat Rai and Sons, Delhi,
2	Satish Chandra and Agarwal M.M, "Railway Engineerin g", 2nd Edition, Oxford University Press, New Delhi ,
3	Khanna S K, Arora M G and Jain S S, "Airport Planni ng and Design", Nemchand and Brothers, Roorkee,
4	C Venkatramaiah, " Transportation Engineering", Vol ume II: Railways, Airports, Docks and Harbours, Bridges and Tunnels, Universities Press
5	Bindra S P, "A Course in Docks and Harbour Engineer ing", Dhanpat Rai and Sons, New Delhi
Reference Books	
1	Oza.H.P. and Oza.G.H., "A course in Docks & Harbour Engineering". Charotar Publishing Co.,
2	Mundrey J.S. "A course in Railway Track Engineering ". Tata McGraw Hill,
3	Srinivasan R. Harbour, "Dock and Tunnel Engineering ", 26th Edition 2013

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Knowledge of railway track components and understanding of maintenance practices.	Remembering Understanding	L1, L2
CO2	Plan and design airport layouts, runways, and taxiways incorporating modern navigational aids.	Applying	L3
CO3	Understand harbor and dock structures, including their design and operational aspects.	Analyzing	L4
CO4	Apply tunneling methods suitable for different geological conditions.	Evaluating	L5
CO5	Integrate AI and modern technologies in transportation system analysis and design.	Creating	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	3														
CO3		3												3	
CO4				3	3									3	
CO5			3									3	3		

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/
2	https://nptel.ac.in/courses/
3	https://nptel.ac.in/courses/
4	https://nptel.ac.in/courses/

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%

Assessment Techniques

- **Internal Assessment (50 Marks):**
  - Weekly assignments, Creative Assessment and quizzes: Max 25 Marks
  - Internal Assessment
    - After 6 weeks
    - After 16 weeks
  - Average of both IA : Max 25 Marks
- **Final Examination (100 Marks):**
  - Answer any 10 questions out of 20, each carrying 10 marks.

Weekly Assignments

Week	Assignment Topic
1	Report on the role of railways in India's transportation sector.
2	Design a basic railway track cross-section with specifications.
3	Calculate runway length considering various correction factors.
4	Case study on the implementation of ILS in modern airports.
5	Design a harbor layout considering natural phenomena.
6	Analysis of different tunneling methods suitable for specific soil conditions.
7	Research on AI applications in traffic signal optimization.
8	Presentation on emerging trends in sustainable transportation.

Creative Assessment (End of Semester)

- **Project:** Develop a proposal for integrating AI in a specific area of transportation engineering (e.g., predictive maintenance in railways, smart traffic management).
- **Presentation:** Each student will present their project findings and proposed solutions.

Model Examination Question Paper (100 Marks)

Instructions: Answer any 10 questions out of the following 20. Each question carries 10 marks.

1. Explain the components of a permanent way and their functions.

2. Discuss the factors influencing the selection of railway gauges.
3. Describe the steps involved in runway orientation using wind rose diagrams.
4. Calculate the corrected runway length given specific parameters.
5. Illustrate the layout of a typical harbor and explain the function of each component.
6. Compare and contrast dry docks and wet docks.
7. Enumerate the methods of tunneling in soft soils and their applicability.
8. Explain the importance of tunnel ventilation and the systems used.
9. Discuss the role of AI in predictive maintenance of railway tracks.
10. Analyze the benefits of implementing ITS in urban traffic management.
11. Design a basic taxiway layout considering ICAO specifications.
12. Explain the significance of navigational aids in harbor operations.
13. Describe the process of transferring the centerline in tunnel construction.
14. Discuss the challenges faced in harbor design due to natural phenomena.
15. Evaluate the impact of autonomous vehicles on future transportation systems.
16. Explain the concept of green logistics and its importance.
17. Discuss the integration of IoT in modern transportation infrastructure.
18. Analyze a case study where AI improved airport operations.
19. Describe the process of track maintenance and the equipment used.
20. Explain the principles of sustainable transportation planning.

Environmental Impact Assessment & Energy Efficient Buildings

Semester	**:**	**5th Semester**				
Course Title	**:**	**Environmental Impact Assessment**				
Course Code	**:**	**BCV544**				
Course Type (Theory/ Practical/ Integrated)	**:**	**THEORY**				
Category	**:**	**PEC – 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 Environmental Impact Assessment (EIA)**, including its processes, regulatory frameworks, types, limitations, and guidelines for developmental projects.
2	**To familiarize students with various EIA methodologies** such as checklist, matrix, network, overlay, and cost-benefit analysis, and to develop skills in describing the affected environment and preparing Environmental Management Plans (EMP).
3	**To enable students to assess and predict environmental impacts** on air, soil, water, noise, socio-economic, and human health attributes and to understand the role of public participation in the EIA process.
4	**To impart knowledge of green building principles and materials**, including embodied energy, lifecycle cost analysis, environmental impacts of conventional materials, and energy-efficient building practices.
5	**To develop an understanding of national and international green building rating systems** (e.g., LEED, BREEAM, GRIHA), sustainable building design principles, and low-energy systems for water, waste, and energy management in the built environment.

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

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 to EIA** Definition of EIA, Need for EIA, EIS, FONSI, Utility of EIA, Scope of EIA, Step by step procedure for conducting EIA, REIA, CEIA, Limitations of EIA, Framework of EIA, EIA Guidelines for developmental projects.	**8 Hours**
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies**	
2	**Guidelines and Regulations** – EPA, EIA Notification of 2006 and subsequent amendments, EC practices in India, terms of reference – Standard and additional for EIA/EMP report for projects/activities, MoEF&CC guidelines on siting of industries, ecologically sensitive areas, NABET accreditation for EIA consultants, Role of National Green Tribunal in EIA. EIS	**9 Hours**
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies, Site Visits, Mini Project.**	
3	**Methodologies & Techniques in EIA** - Adhoc, checklist, matrix, overlays, networks, Battle Environmental Evaluation Systems (BEES), Cost-BenefitAnalysis (CBA), brain storming, fuzzy, Delphi technique, Contents of EIA -Structure of EIA, Onsite and Offsite Emergency Plan, Environmental Management plan (EMP) and Disaster Management Plan (DMP).	**8 Hours**
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies, Site Visits**	
4	**Environmental Attributes** - Value function plots and standards for Environmental attributes - Air, water, land; Simulation models. Impacts on Socio economic aspects, biodiversity. Public participation in EIA - Need, objectives, elements and framework for public participation – step by step procedure	**8 Hours**
Pedagogy	**Chalk and Talk, PPT, YouTube Lectures, Case Studies, Site Visits**	
5	Post EIA activities - EIA audit –Types and auditing procedure EIA case studies – Category A, B1 and B2.	**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	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Y.Anjaneyulu and Valli Manickam, "Environment AssessmentMethodologies", B.S Publications, Hyderabad, 2007.
2	R.K Jain et.al Van Nostrand, "Environmental Impact Analysis" – Reinhold Company, 1977

3	Harharalyer G, Green Building Fundamentals, Notion Press
4	Dr. Adv. HarshulSavla, Green Building: Principles & Practices
Reference Books	
1	Larry W Canter, "Environmental Impact Assessment" –McGraw – Hill International Editions, 1996.
2	Guidelines for EIA of Developmental Projects, Minister of Environment and Forests, GOI.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand and Remember the purpose, scope, and procedures of Environmental Impact Assessment (EIA), including guidelines and regulatory frameworks for developmental projects.	Understand/Remember	L1
CO2	Apply various EIA methodologies such as Ad-hoc, Checklist, Matrix, Network, and Overlay methods to real-life developmental scenarios.	Apply	L2
CO3	Analyze the environmental impacts on air, soil, water, noise, and socio-economic attributes, and assess the effectiveness of mitigation measures.	Analyse	L3
CO4	Evaluate and compare conventional and green building materials and systems using life cycle costing and sustainability parameters.	Evaluate	L4
CO5	Design sustainable building concepts incorporating green rating systems (GRIHA, LEED, etc.), passive solar technologies, and low-energy water and waste management solutions.	Create	L5

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	Links:https://youtu.be/8vymflfip2w?list=PLLy_2iUCG87CkrNdXME16BCptwGx1fl 67 https://youtu.be/E_oRwSRdgcQ?list=PLLy_2iUCG87CkrNdXME16BCptwGx 1fl67
2	Links:https://youtu.be/E_oRwSRdgcQ?list=PLLy_2iUCG87CkrNdXME16BCptwGx 1fl67 https://youtu.be/cnVH8xVYsqw?list=RDCMUCY- ANi3wxkUSGhAeI7T0TGw
3	Links:https://youtu.be/E_oRwSRdgcQ?list=PLLy_2iUCG87CkrNdXME16BCptwGx 1fl67 https://youtu.be/cnVH8xVYsqw?list=RDCMUCY- ANi3wxkUSGhAeI7T0TGw
4	NPTEL Links: https://www.youtube.com/watch?v=WIqeZH_0jqQ https://www.youtube.com/watch?v=4pZ1V0_kkNY
5	https://www.youtube.com/watch?v=THgQF8zHBW8 https://www.youtube.com/watch?v=DRO_rIkywxQ

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 (100 Marks):

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember & Understand	20
Apply	30
Analyse	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%

Semester	:	**5th Semester**				
Course Title	:	**Extensive Survey Project**				
Course Code	:	**BCV506**				
Course Type (Theory/ Practical/ Integrated)	:	**Practical (LAB)**				
Category	:	**Mini Project**				
Stream	:	**Civil**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:0**		**SEE**	:	**50**
Total Hours	:	**35**		**SEE Duration**	:	**03**
Credits	:	**02**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**To impart practical knowledge of modern surveying techniques** such as total station, theodolite, and GPS through hands-on field experience.
2	**To develop skills in collecting, analyzing, and interpreting spatial data** for various types of civil infrastructure like tanks, highways, triangulation networks, and town planning layouts.
3	**To train students in preparing engineering drawings, layout maps, and reports** that comply with technical standards and planning regulations.
4	**To enable students to work collaboratively in teams** and manage tasks efficiently during on-site project execution.

Teaching-Learning Process

- To be conducted before the commencement of 5th Semester for a period of 2 weeks including training on total station.
- Viva voce conducted along with 5th semester exams
- An extensive project preparation training involving investigation, collection of data is to be conducted.
- **Use of Total Station is compulsory**
- The student shall submit a project report consisting of designs and drawings.
- Drawings should be done using CAD and survey work using total station
- Students should learn data download from total station, generation of contours, block leveling, longitudinal and cross sectional diagrams, and capacity volume calculation by using relevant softwares
- The course coordinators should give exposure and simulate activities to achieve the course outcomes

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)

Sl. No.	Experiments/Programs
1	**NEW TANK PROJECTS:** The work shall consist of, a. Reconnaissance survey for selection of site and conceptualization of project.

	b. Alignment of centre line of the proposed bund, Longitudinal and cross sections of the centre line. c. Detailed survey required for project execution like Capacity surveys, Details at Waste weir and sluice points, Canal alignment etc. as per requirement d. Design and preparation of drawing with report.
2	**HIGHWAY PROJECT**: The work shall consist of, a. Reconnaissance survey for selection of site and conceptualization of project. b. Preliminary and detailed investigations to align a new road (min. 1 to 1.5 km stretch) between two obligatory points. The investigations shall consist of topographic surveying of strip of land for considering alternate routes and for final alignment. Surveying by using total station. c. Report should justify the selected alignment with details of all geometric designs for traffic and design speed assumed. d. Drawing shall include key plan initial alignment, final alignment, longitudinal section along final alignment, typical cross sections of road
3	**RESTORATION OF AN EXISTING TANK:** The work shall consist of, a. Reconnaissance survey for selection of site and conceptualization of project. b. Alignment of centre line of the existing bund, Longitudinal and cross sections of the centre line. c. Detailed survey required for project execution like Capacity surveys, Details at Waste weir and sluice points, Canal alignment etc. as per requirement d. Design of all elements and preparation of drawing with report.
4	**Triangulation Survey**: The work shall consist of, a. Reconnaissance survey for selection of site and conceptualization of project. b. Establishment of Survey Stations c. Measurement of Base Line, Angle Measurements, Computation and Adjustments of measurements and calculations. d. Plot the triangulation network on a suitable scale using coordinate plotting, Prepare final maps and diagrams showing triangulation framework, station positions, and details.
5	**Town Planning and Water Supply Project:** The work shall consist of, a. Reconnaissance survey for selection of site and conceptualization of project. b. Detailed survey required for project execution like contour surveys c. Preparation of layout plans as per regulations e. Centreline marking transfer of centre lines from plan to ground d. Examination of sources of water supply, Calculation of quantity of water required based on existing and projected population. e. Preparation of village map by using total station. f. Survey work required for laying of water supply and UGD g. Location of sites for water tank. Selection of type of water tank to be provided. (ground level, overhead and underground) h. Design of all elements and preparation of drawing with report as per regulations

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Surveying Vol. I, II & III, Laxmi Publications
2	**R. Agor,** *Surveying and Levelling,* Khanna Publishers
3	**S.K. Duggal,** *Surveying Vol. I & II,* McGraw Hill Education
4	**Subramanian R.,** *Surveying and Levelling,* Oxford University Press

Reference Books	
1	**G.S. Birdie and J.S. Birdie,** *Water Supply and Sanitary Engineering* Dhanpat Rai Publishing
2	**T.P. Kanetkar & S.V. Kulkarni,** *Surveying and Levelling (Part 1 & 2)* Pune Vidyarthi Griha
3	**Rangwala S.C.,** *Town Planning* Charotar Publishing House
4	**S.K. Khanna, C.E.G. Justo, A. Veeraragavan,** *Highway Engineering* Nem Chand & Bros.
5	**Dr. K.R. Arora,** *Irrigation, Water Resources and Water Power Engineering* Standard Publishers

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Apply** field survey techniques using modern instruments to gather, process, and utilize topographical data for execution of civil engineering project	L3	Apply
CO2	**Perform** reconnaissance surveys and conceptualize civil engineering projects including tanks, roads, triangulation networks, and town layouts.	L4	Analysis
CO3	**Evaluate** and justify engineering decisions in alignment selection, design parameters, and data adjustments to ensure technical soundness and sustainability.	L5	Evaluate
CO4	**Create** detailed maps, design elements, and drawings for civil engineering projects based on field survey data and regulatory norms.	L6	Create

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	3				3							3	1		
CO2		3										3		1	
CO3				3	3		3					3			
CO 4			3		3					3		3			1

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=dAV5c-iYjHk
2	https://www.youtube.com/watch?v=xdZILMrRkzo

CIE- Continuous Internal Evaluation & SEE – Session End Examination (50 Marks)

Scheme of Examination for Extensive Survey Project

Examination Marks = 50

Part A – Design of components of projects (consisting of two designs) carried out

(1) The design steps and procedure for one of the following components may be asked: **25 Marks**

(a) Design of Canal Drop

(b) Design of Tank sluice

(c) Design of Surplus weir with apron

(2) One of the following components may be asked to design (the data shall be given during the examination)**: 15 Marks**

(a) Earthwork calculation given the RLs and cross-section of road

(b) Population forecasting

(c) Design of simple horizontal curve

(d) Design of transition curve

(e) Design of vertical curve

(f) Design of pump

(g) Design of pipe

(h) Design of sedimentation tank

(i) Design of filter

(j) Design of oxidation pond

(k) Design of canal

Part B – Presentation and Viva-voce: 10 Marks

Semester	**:**	**V**				
Course Title	**:**	**Seismology and Fundamentals of Earthquake Engineering**				
Course Code	**:**	**BCV507**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Ability Enhancement Course**				
Category	**:**	**AEC**				
Stream	**:**	**Structural Engineering**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**2:0:0:2**		**SEE**	**:**	**50**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3 Hrs**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**Outline** the importance of seismology and concepts of earthquake resistant design
2	**Develop** intuitive aspects of behaviour of buildings subjected earthquake forces
3	**Extend** structural configuration importance to analysis and design of structures
4	**Importance** of seismic codes in design
5	**Modify** structural configuration to adapt

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 -2023-24

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Research Methodology** **Earth and Its Interior, Plate Tectonics & Earthquakes-** Structure of the Earth and its interior; Convection and circulation within the Earth; Theory of Plate Tectonics; Origin and occurrence of Earthquakes; Types of Earthquakes; Faults and their types; Seismic waves – Body and Surface waves; Measuring Instruments for Earthquakes; Characteristics of Strong Ground Motions.	
Pedagogy	• Pedagogy: Chalk and Talk, PowerPoint Presentations • https://onlinecourses.nptel.ac.in/noc22_ge08/preview	
2	**Seismic Hazard: Magnitude, Intensity, Zones & Historical Perspective-** Earthquake Magnitude and Intensity – Scales used; Seismic Zones of India as per IS 1893; Basic Geography and Tectonic Features of India; Prominent Historical Earthquakes in India and their impacts; Concept of Inertia forces in structures..	
Pedagogy	• Pedagogy: Chalk and Talk, PowerPoint Presentations • Links: https://onlinecourses.nptel.ac.in/noc22_ge08/preview	
3	**Architectural Considerations & Seismic Design Philosophy**- Importance of Architectural Features in Earthquake-Resistant Design; Influence of Size, Shape, and Symmetry of Buildings; Fundamental Natural Period of Buildings; Twisting of Buildings – Causes and Effects; Earthquake Design Philosophy; Overview of Seismic Codes (IS 1893, IS 13920); Importance of Ductility in Buildings; Construction Techniques to Impart Ductility	
Pedagogy	• Pedagogy: Chalk and Talk, PowerPoint Presentations • Links: https://onlinecourses.nptel.ac.in/noc23_ge36/preview	
4	**Seismic Behaviour of Structures-** Seismic Behaviour of Masonry Structures; Vertical and Horizontal Bands in Masonry Buildings – Need and Importance; Confined Masonry Construction; Seismic Behaviour of Reinforced Concrete Buildings; Importance of structural Configuration, Weak Beam-Strong Column Philosophy; Detailing of Reinforcement; Beam-Column Joints; Open Ground Storey (Soft Storey) Effects.	
Pedagogy	• Pedagogy: Chalk and Talk, PowerPoint Presentations • Links: https://archive.nptel.ac.in/courses/110/105/110105139/	
5	**Advanced Seismic Protection & Foundations-** Shear Walls – Functions, Advantages, Positioning and Direction; Seismic Dampers and Base Isolation Systems; Load Paths for Effective Transfer of Lateral Forces; Protection of Non-Structural Elements during Earthquakes; Foundations for Earthquake-Resistant Buildings; Effects of Soil Liquefaction and Mitigation Measures.	
Pedagogy	• Pedagogy: Chalk and Talk, PowerPoint Presentations Links: https://archive.nptel.ac.in/courses/110/105/110105139/	

	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.	"Earthquake-Resistant Design of Buildings" – Published by Gujarat State Disaster Management Authority (GSDMA)
2.	"Earthquake Tips" Series – Dr. C. V. R. Murty, Published by IIT Kanpur & GSDMA.
3.	IS 1893 (Part 1): 2016 – Indian Standard Criteria for Earthquake Resistant Design of Structures, BIS.
4.	IS 13920: 2016 – Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces, BIS.
Reference Books	
1	"Earthquake Resistant Design of Structures" – Pankaj Agarwal and Manish Shrikhande, PHI Learning, Latest Edition.
2	"Design of Earthquake Resistant Buildings" – Minoru Wakabayashi, McGraw Hill.
3	"Seismic Design for Architects: Outwitting the Quake" – Andrew Charleson, Routledge.

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** the importance of seismology and concepts of earthquake resistant design	**Understand/Remember**	**L1**
CO2	**Apply** concepts of structural configuration to design buildings subjected earthquake forces	**Apply**	**L2**
CO3	**Analyze** seismic codes to understand concepts of earthquake engineering	**Analyse**	**L3**
CO4	**Investigate** existing structures for structural configuration and propose modifications	**Design**	**L4**
CO5	**Create** different structural plans to optimize engineering aspects of design	**Create**	**L5**

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	**1**														
CO3		**1**													
CO4			**1**			**1**						**1**			
CO5				**1**		**1**						**1**			**1**

Weblinks and Video Lectures (e-Resources)	
1	http://www.gsdma.org/uploads/Assets/key-projects/earthquakebehaviour06172017025353283.pdf
2	https://www.nicee.org/EQTips.php

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		
Analyse	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	**20**
Understand	**30**
Apply	**30**
Analyse	**10**
Evaluate	**10**
Create	**20**

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								22%
CO2								22%
CO3								22%
CO4								18%
CO5								16%
Total								

Semester	:	**VI**				
Course Title	:	**FUNDAMENTALS OF BRIDGE ENGINEERING**				
Course Code	:	**BCV514**				
Course Type (Theory/ Practical/ Integrated)	:	**THEORY**				
Category	:	**PEC-2**				
Stream	:	**CIVIL**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**45**		**SEE Duration**	:	**3 Hrs**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**Making student understand** the basics, evolution, classification and know the present scenario in the filed of surveying
2	**Getting students to know** the tools, procedure, methods of data collection & application to get the required information of the land surveyed by adopting midsegment surveying
3	**Having information** of digital surveying, tools, using data acquired for preparing land characteristics
4	**To create awareness** & usage techniques of Advanced digital surveying methods & related equipment
5	**Complete knowledge** of various process & methods involved in data acquisition, retrieval and application of the same.

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**

DSATM

Scheme of Teaching and Examinations for BE Program -2023-24

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction**: Definition, classification of bridges, components of bridge, Site Selection for Bridges, Hydraulic design for linear waterway & economical span	6
Pedagogy	• Pedagogy/Course delivery tools: Chalk and talk, invited lectures from industrypeople, Power point Presentation, video. • Links: https://www.youtube.com/watch?v=klw2Sb6U_Ik&t=2009s	
2	**RCC Box culvert:** Introduction, Behavior of Box girder bridges, Design of box culvert subjected to class AA tracked vehicle and class AA wheeled vehicle	8
Pedagogy	• Pedagogy/Course delivery tools: Chalk and talk, invited lectures from industrypeople, Power point Presentation, video. • Links: https://www.youtube.com/watch?v=tVrp4M9HoxY	
3	**RCC Slab Culvert**: Introduction, Behavior of slab culvert, Design and detailing of slab culvert subjected to 70R (T) vehicle, 70R (w) vehicle and Class A loading.	8
Pedagogy	• Pedagogy/Course delivery tools: Chalk and talk, Power point presentation • Links: https://www.youtube.com/watch?v=trXqga2z1J4	
4	**T-Beam Bridge**: Introduction, Behavior of T-beam bridge, Design and detailing of slab panel, cross girder, main girder using COURBON"S Method, subjected to 70R (T) vehicle.	10
Pedagogy	• Pedagogy/Course delivery tools: Chalk and talk, Power point presentation • Links: https://www.youtube.com/watch?v=klw2Sb6U_Ik&t=2009s	
5	**Substructure, Foundations, Bearings, Joints and Appurtenances:** Definition of pier and abutment behaviour of pier and abutment, loads to be considered on pier and abutment, types of foundations for pier and abutment and loads to be considered on them, Importance of bridge bearings, sketches of different types of bearings. Articulation - details	8
Pedagogy	• Pedagogy/Course delivery tools: Chalk and talk, Power point presentation • Links: https://www.youtube.com/watch?v=v8UwdPqS3FI https://www.youtube.com/watch?v=2-0mRsaAgCk	

	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.	Johnson D Victor, "Essentials of Bridge Engineering", Oxford & IBHPublishing Co New Delhi.
2.	Krishna Raju N, "Design of Bridges", Oxford & IBH Publishing Co NewDelhi.
3.	**Bridge Engineering- Rangawala- Charotar Publication House-1996**
4.	**Design of Bridge Structures -T R Jagadeesh & M R Jayaram; Printice Hall of India;**
5.	**Bridge Engineering-Asheesh Kumar-Vayu Education of India Publication**
Reference Books	
1	SP Bindra, - "Principles and Practice of BridgeEngineering", Dhanpat Rai & Sons Publications;New Delhi
2	IRC 6–2000 Standard Specifications and Code of Practice for Road BridgesSection II Loadsand Stresses, The Indian Road Congress New Delhi
3	IRC-21, IS456 (2000), SP-16, SP-34
4	**Bridge Engineering – S Ponnuswamy- Mc. Graw Hill Publication 2007**
5	**Essentials of Bridge Engineering- M K Pant-**
6	Highway & Bridge Engineering- B L Gupta & Amith Gupta-
7	**Bridge Engineering- J S Alagia- Charotar Publication House- 8th Edition 2011**
8	**Bridge Engineering: Classifications, Design Loading, and Analysis Methods: Weiwei Lin (Author), Teruhiko Yoda (Author): Butterworth-Heinemann Inc**

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understanding Bridges, essentials, components of bridge and loads & load flow mechanism	**Understand/Remember**	**L1**
CO2	Apply basic concept of planning, site selection, geometrical elements & design: loads and investigation for bridges	**Apply**	**L2**
CO3	Design slab culverts as per IRC specifications	**Analyse**	**L3**
CO4	Design T-beam bridges as per IRC specifications	**Design**	**L4**
CO5	Identify the causes of failure of bridges due to faulty design, poor quality of materials and construction methods	**Create**	**L5**

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				√				√							
CO5						√									√

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=klw2Sb6U_Ik&t=2009s
2	https://www.youtube.com/watch?v=tVrp4M9HoxY
3	https://www.youtube.com/watch?v=trXqga2z1J4
4	https://www.youtube.com/watch?v=klw2Sb6U_Ik&t=2009
5	https://www.youtube.com/watch?v=v8UwdPqS3FI And https://www.youtube.com/watch?v=2-0mRsaAgCk

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				
Apply				
Analyse				
Evaluate				
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**	
CO2	√	√	√	√			**18**	
CO3				√	√	√	**18**	
CO4					√	√	**10**	
CO5							**04**	
Total								

SEE- Semester End Examination (50 Marks):

Bloom's Category	**SEE Marks (90% Theory+10% Practical Questions)**
Remember	
Understand	
Apply	
Analyse	
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								22%
CO2								22%
CO3								22%
CO4								18%
CO5								16%
Total								

Semester	**:**	**5th semester**				
Course Title	**:**	**Seismology and Fundamentals of Earthquake Engineering**				
Course Code	**:**	**BCV507**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Ability Enhancement Course**				
Category	**:**	**AEC**				
Stream	**:**	**Structural Engineering**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**2:0:0:0**		**SEE**	**:**	**50**
Total Hours	**:**	**30**		**SEE Duration**	**:**	**3 hours**
Credits	**:**	**2**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Outline the importance of seismology and concepts of earthquake resistant design
2	Develop intuitive aspects of behaviour of buildings subjected earthquake forces
3	Extend structural configuration importance to analysis and design of structures
4	Importance of seismic codes in design
5	Modify by structural configuration to adapt

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 Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

DSATM

COURSE CURRICULUM

Module No.	Topics	Hours
1	Earth and Its Interior, Plate Tectonics & Earthquakes- Structure of the Earth and its interior; Convection and circulation within the Earth; Theory of Plate Tectonics; Origin and occurrence of Earthquakes; Types of Earthquakes; Faults and their types; Seismic waves – Body and Surface waves; Measuring Instruments for Earthquakes; Characteristics of Strong Ground Motions.	8
Pedagogy	Demonstration (Hard and Soft), Quiz and Case studies	
2	Seismic Hazard: Magnitude, Intensity, Zones & Historical Perspective- Earthquake Magnitude and Intensity – Scales used; Seismic Zones of India as per IS 1893; Basic Geography and Tectonic Features of India; Prominent Historical Earthquakes in India and their impacts; Concept of Inertia forces in structures.	8
Pedagogy	Demonstration (Hard and Soft), Quiz and Case studies	
3	Architectural Considerations & Seismic Design Philosophy- Importance of Architectural Features in Earthquake-Resistant Design; Influence of Size, Shape, and Symmetry of Buildings; Fundamental Natural Period of Buildings; Twisting of Buildings – Causes and Effects; Earthquake Design Philosophy; Overview of Seismic Codes (IS 1893, IS 13920); Importance of Ductility in Buildings; Construction Techniques to Impart Ductility.	8
Pedagogy	Demonstration (Hard and Soft), Quiz and Case studies	
4	Seismic Behaviour of Structures- Seismic Behaviour of Masonry Structures; Vertical and Horizontal Bands in Masonry Buildings – Need and Importance; Confined Masonry Construction; Seismic Behaviour of Reinforced Concrete Buildings; Importance of structural Configuration, Weak Beam-Strong Column Philosophy; Detailing of Reinforcement; Beam-Column Joints; Open Ground Storey (Soft Storey) Effects.	8
Pedagogy	Demonstration (Hard and Soft), Quiz and Case studies	
5	Advanced Seismic Protection & Foundations- Shear Walls – Functions, Advantages, Positioning and Direction; Seismic Dampers and Base Isolation Systems; Load Paths for Effective Transfer of Lateral Forces; Protection of Non-Structural Elements during Earthquakes; Foundations for Earthquake-Resistant Buildings; Effects of Soil Liquefaction and Mitigation Measures.	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**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	**"Earthquake-Resistant Design of Buildings" – Published by Gujarat State Disaster Management Authority (GSDMA)**
2	**"Earthquake Tips" Series – Dr. C. V. R. Murty, Published by IIT Kanpur & GSDMA.**
3	**IS 1893 (Part 1): 2016 – Indian Standard Criteria for Earthquake Resistant Design of Structures, BIS.**
4	**IS 13920: 2016 – Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces, BIS.**
Reference Books	
1	**"Earthquake Resistant Design of Structures" – Pankaj Agarwal and Manish Shrikhande, PHI Learning, Latest Edition.**
2	**"Design of Earthquake Resistant Buildings" – Minoru Wakabayashi, McGraw Hill.**
3	**"Seismic Design for Architects: Outwitting the Quake" – Andrew Charleson, Routledge.**

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

Identify the importance of seismology and concepts of earthquake resistant design
Develop intuitive aspects of behaviour of buildings subjected earthquake forces
Map Extend structural configuration importance to analysis and design of structures
Have knowledge of seismic codes in design
Gain know how for Modifying structural configurations to adapt to field specific requirments

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	**Remember and Understand the importance of seismology and concepts of earthquake resistant design**	**Remember & understand**	**L1 &L2**
CO2	**Apply concepts of structural configuration to design buildings subjected earthquake forces**	**Apply**	**L3**
CO3	**Analyze seismic codes to understand concepts of earthquake engineering**	**Analyze**	**L4**
CO4	**Investigate existing structures for structural configuration and propose modifications**	**Evaluate**	**L5**
CO5	**Create different structural plans to optimize engineering aspects of design**	**Create**	**L6**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1															
CO2	1														
CO3		1													
CO4			1			1						1			
CO5				1		1						1			1

Weblinks and Video Lectures (e-Resources)	
1	file:///D:/DRIVEC-D/ss/CDP-2025-26/BCV507-SFEE/EBB_001_30May2013.pdf
2	https://www.nicee.org/EQTips.php

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					
Understand	10	10			
Apply	20	20			
Analyse	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	20
Understand	30
Apply	30
Analyse	10
Evaluate	10
Create	20

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 2024-25)

Semester	:	**5th Semester**			
Course Title	:	**Environmental Studies and E-Waste Management**			
Course Code	:	**BCV 508**			
Course Type (Theory/ Practical/ Integrated)	:	**THEORY**			
Category	:	**MC**			
Stream	:	**CIVIL**	**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**2:0:0:0**	**SEE**	:	**50**
Total Hours	:	**15**	**SEE Duration**	:	**1 Hr**
Credits	:	**1**			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**To introduce** students to the fundamental concepts of the environment, ecosystems, and biodiversity, emphasizing their interdependence and significance in sustaining life.
2	To identify the causes, effects, control measures major challenges of pollution of environmental problems and e-waste management.
3	To provide guidance on developing skills, and demonstrate socio-economic skills for Environmental protection e-waste management.

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	**Environment and Sustainability**: **Environment & Ecosystem:** Components of the environment, Ecosystems: Structure and Function, Types: Forest, Wetlands, River, Oceanic and Lake ecosystem. **Sustainability**: 17SDG targets and possible actions. Self-Study Component (SSC): Biodiversity: Types, Values, and Conservation of biodiversity.	3
Pedagogy	Chalk and talk, PowerPoint presentation and animation tools	
2	**Natural resources and Energy:** Natural Resources: Water resources – Availability & Quality aspects, Water borne diseases & Fluoride problem in drinking water. Energy: Different types of energy, Wind Energy, Hydrogen as an alternative energy. Self-Study Component (SSC): Conventional sources & Non -Conventional sources of Energy, Solar energy	3
Pedagogy	Chalk and talk, PowerPoint presentation , Videos, Case studies	
3	**Environmental Pollution and Global Environmental Issues** Environmental Pollution: Water Pollution, Noise pollution, Air pollution (Sources, Impacts, Preventive measures, Case studies, Relevant Environmental Acts) Global Environmental Issues: Acid Rain, Ozone Depletion, Global warming and Ground water depletion. Self-Study Component (SSC): Case studies of air pollution episodes.	3
Pedagogy	PowerPoint presentation, Videos and Case studies.	
4	**Waste management & Environmental Legislation:** Waste management: Solid Waste Management, types and sources, Biomedical Waste Management - Sources, Characteristics, Environmental Legislation: Water Act 1974, Air Act 1981, Environmental Protection Act 1984 Solid Waste Management Rules,2016, Biomedical Waste Management Rules, 2016. Self-Study Component (SSC): Case studies on waste management options	3
Pedagogy	PowerPoint presentation, Seminar, Demonstration Videos	
5	**E - Waste Management** E- waste: Composition and generation, Global context in e- waste; E-waste pollutants, E waste hazardous properties, Effects of pollutant (E- waste) on human health and surrounding environment.	3

	Component of E waste management. E-waste (Management and Handling) Rules, 2011; and E-Waste (Management) Rules, 2022 - Salient Features and its implications. Self-Study Component (SSC): E-Waste (Management) Amendment Rules, 2023, 2024	
Pedagogy	Power Point presentation, Demonstration videos and Poster 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	**S M Prakash – Environmental Studies,3rd Edition Elite Publishers, Mangalore, 2018.**
2	**Hester R.E., and Harrison R.M, Electronic Waste Management. Science, 2009.**
3	**Benny Joseph- Environmental studies, Tata Mcgraw-Hill 2nd edition 2012.**
Reference Books	
1	**R Geetha Balakrishna & K G Lakasminarayana Bhatta- Environmental Studies, S M Publications, 2006-2007.**
2	**M.Ayi Reddy Textbook of environmental science and Technology, BS publications 2007**
3	**Johri R., E-waste: implications, regulations, and management in India and current global best practices, TERI Press, New Delhi.**
4	**Dr. B.S Chauhan- Environmental studies, university of science press 1st edition**
5	**M.Ayi Reddy Textbook of environmental science and Technology, BS publications 2007**

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

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	**To understand the principles of ecology and environmental issues that apply to air, land and water issues along with e-waste management on a global scale.**	**Understand/Remember**	**L1**
CO2	**To evaluate the societal complex issues related to environment and e-waste management.**	**Design**	**L4**
CO3	**To develop sustainable solution for environmental issues and e-waste management issues**	**Create**	**L5**

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									2	2				2	1
CO3								3		3					

Weblinks and Video Lectures (e-Resources)	
1	https://youtu.be/I_bnGkviWOUhttps://youtu.be/Ar04qG1P8Es
2	https://sdgs.un.org/goals
3	https://kspcb.karnataka.gov.in/waste-management/biomedical-waste
4	https://archive.nptel.ac.in/courses/109/105/109105190/
5	https://youtu.be/I_bnGkviWOUhttps://youtu.be/Ar04qG1P8Es

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	25	25		
Understand				
Apply				
Analyse				
Evaluate			25	
Create				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	10	10	5	10	10	5	25	100%
CO2								
CO3								
Total								

SEE- Semester End Examination (50 Marks):

Bloom's Category	SEE Marks (100% Theory Questions)
Remember	50 MCQ's -50 Marks
Understand	
Apply	
Analyse	
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	5	5	10	10	50	100%
CO2								
CO3								
Total	10	10	5	5	10	10	50	

Dayananda Sagar Academy of Technology & Management
(Autonomous Institute under VTU)
DEPARTMENT OF CIVIL ENGINEERING

Affiliated to VTU
Approved by AICTE
Accredited by NAAC with A+ Grade
6 Programs Accredited by NBA
(CIVIL, CSE, ISE, ECE, EEE, MECH)

6th 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 601	Design & Drawing of Steel Structural elements	IPCC	CVL	CVL	3	0	2	0	5	4	3	50	50	100
2	BCV 602	Hydrology & Irrigation Engineering	PCC	CVL	CVL	3	0	0	0	3	3	3	50	50	100
3	BCV 603	Applied Geo-Technical Engineering	PCC / PBL	CVL	CVL	3	0	0	0	3	3	3	50	50	100
4	BCV 604	As per list of PEC-2	PEC-2	CVL	CVL	3	0	0	0	3	3	3	50	50	100
5	BCV 605	As per the list of OEC-1	OEC-1			3	0	0	0	3	3	3	50	50	100
6	BCV 606	Geo Technical Laboratory	PCCL	CVL	CVL	1	0	2	0	3	2	3	50	50	100
7	BCV 607	Final Year Project Phase – I [RM+IPR]	Maj Proj	CVL	CVL	0	01	0	2	3	2	3	50	50	100
8	BCV 608	GS & RS [50 CIE as 50 as SIE]	SDC	CVL	CVL	1	0	0	2	3	2	3	50	50	100
9		NSS / YOGA / PED	NCMC	CVL	CVL	0	0	2	0	1	0	0	100	-	100
		TOTAL				18	1	6	4	29	22		500	400	900

PROFESSIONAL ELECTIVE COURSE[PEC]-II

Sl.No	Course Code	Course Name
1	BCV614	Advanced Concrete Technology & Construction Techniques
2	BCV624	Urban transport Planning
3	BCV634	Solid Waste management
4	BCV644	Design of Form Works & shuttering

OPEN ELECTIVE [OEC] - I

Sl.No	Course Code	Course Name
1	BCV615	Life Cycle assessment & carbon Credits
2	BCV625	Sustainable Development Goals & Construction practices
3	BCV635	Renewable Energy Systems
4	BCV645	Industrial safety & Risk Management

CURRICULUM DESIGN

CIVIL ENGINEERING

6TH SEMESTER

DSSE

BCV601

Semester					
Course Title	**:**	**Design of Steel Structural Elements**			
Course Code	**:**	**BCV601**			
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**			
Category	**:**	**IPCC**			
Stream	**:**	**Structural Engineering**	**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**2:2:2:0**	**SEE**	**:**	**50**
Total Hours	**:**	**50**	**SEE Duration**	**:**	**3 hours**
Credits	**:**	**4**			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**Contrast** different Indian standard rolled steel sections,bolts,flats,connections and design of structural elements as per IS800:2007 code.
2	**Utilize** IS800:2007 code provisions to design bolted and welded connections.
3	**Solve** problems to select suitable sections to withstand tension,compression and bending stresses
4	**Investigate** forces on existing structural components of a building
5	**Develop** design excel sheets of structural elements in accordance with IS800:2007 code provisions

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:** Advantages and Disadvantages of Steel Structures, Limit state method Limit State of Strength, Structural Stability, Serviceability Limit states, Failure Criteria of steel, Design Consideration, Loading and load combinations, IS code provisions, Specification and Section classification. **Plastic Behaviour of Structural Steel:** Introduction, Plastic theory, Plastic Hinge Concept, Plastic collapse load, load factor, Shape factor, Theorem of plastic collapse, Methods of Plastic analysis.	8
Pedagogy	**Demonstration site visit and workshop**	
2	**Bolted Connections:** Introduction, Types of Bolts, Behaviour of bolted joints, Design of High Strength friction Grip (HSFG) bolts, Design of Simple bolted Connections (Lap and Butt joints) and bracket connections both types	7
Pedagogy	**Video of construction process of a site under execution**	
3	**Welded Connections:** Introduction, Types and properties of welds, Effective areas of welds, Weld Defects, Simple welded joints for truss member and Bracket connections both types. Advantages and Disadvantages of Bolted and Welded Connections.	7
Pedagogy		
4	**Design of Compression Members**: Introduction, Behavior of compression members, Failure modes, Effective length of compression members, Slenderness ratio, Design of rolled steel compression members and built up Compression members, Design of Laced and Battened Systems. **Design of Column Bases**: Design of Simple Slab Base and Gusseted Base	9
Pedagogy		
5	**Design of Tension Members:** Introduction, Types of Tension members, Modes of Failure, Factors affecting the strength of tension members **Design of Beams** : Classification of sections, Design of laterally supported beams, selection of sections, shear capacity of sections, moment capacity of sections and control of deflection.	9
	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
	Detailing of steel structures using **AUTO-CADD**	
1	Connections – Beam to beam, Beam to Column by Bolted and Welded Connections.	**CO4 &5**
2	Built-up Columns with lacings and battens	**CO4 &5**
3	Column bases and Gusseted bases with bolted and welded connections.	**CO4 &5**
4	Roof Truss – Welded and Bolted	**CO4 &5**
5	Welded Plate girder	**CO4 &5**
6	Gantry Girder	**CO4 &5**
	Detailing of RCC structures using **AUTO-CADD**	
7	Beams – Simply supported, Cantilever and Continuous.	**CO4 &5**
8	Staircase – Doglegged	**CO4 &5**
9	Slab – One way, Two way and One-way continuous.	**CO4 &5**
10	Cantilever Retaining wall	**CO4 &5**
11	Counter Fort Retaining wall	**CO4 &5**
12	Circular Water Tank, Rectangular Water Tank.	**CO4 &5**
	Open ended Programs	
1	Preparing design excel sheet of existing building to investigate design capacity	**CO4 &5**
2	Preparing design excel sheet of existing building to investigate design demands	**CO4 &5**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	S S Bhavikatti, Design of steel structures : by limit state method as per is: 800-2007, 5th edn,I.K international publishing house
2	S K Duggal, "Limit State Design of Steel Structures" McGraw Hill Publications Chennai.
3	IS800-2007,SP-6,SP-34
Reference Books	
1	N Subramanian, Design of Steel Structures Oxford University Press, New Delhi, India.

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** Rolled steel section material and geometrical properties to extract from IS tables to design various structural components to carry loads	Remember & understand	L1 &L2
CO2	**Apply** provisions of IS800-2007 to find strength of connections and different structural components	Apply	L3
CO3	**Analyze** connections and structural components to design for safety and serviceability to withstand loads.	Analyze	L4
CO4	**Investigate** existing buildings to prepare design excel sheets of demand and capacity and developing AutoCAD drawings	Evaluate	L5
CO5	**Create** structural skeleton of a G+3 residential building in accordance with IS800:2007 code provisions	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	3														
CO3		3										3	1		
CO4				3								3		1	
CO5			3		2	2	2					3			1

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/105105162
2	https://nptel.ac.in/courses/105104224
3	https://nptel.ac.in/courses/105105162
4	https://nptel.ac.in/courses/105105216

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					
Understand	10	10			
Apply	20	20			50
Analyse	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	**20**
Understand	**30**
Apply	**30**
Analyse	**10**
Evaluate	**10**
Create	**20**

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%

Semester	**:**	**VI semester**				
Course Title	**:**	**Hydrology and Irrigation Engineering**				
Course Code	**:**	**BCV602**				
Course Type (Theory/ Practical/ Integrated)	**:**	**THEORY**				
Category	**:**	**PCC**				
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	Understand the process of of hydrological cycle and basic Irrigation concepts involved with respect to civil engineering in balancing the environmental factors and available resources .
2	Crystal Clear knowledge of hydrological and irrigation engineering principle to carry out the environmental assessments in predicting the future of water resources .
3	Use the principles of hydrology and irrigation, to analyze the requirements in order to improve the socio economic situations by addressing the immediate problems.
4	Evaluate the situation based on present and past data, by conducting the statistical analysis and all engineering components with respect to hydrology and irrigation.
5	Design the basic hydraulic and irrigation structures to protect and manage the natural resources.

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 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Hydrology**: Introduction, Importance of hydrology, Global distribution of water and Indian water availability, Practical application of hydrology, Hydrologic cycle (Horton's) qualitative and engineering representation. **Precipitation**: Definition, Forms and types of precipitation, measurement of rain fall using Symon's and Syphon type of rain gauges, optimum number of rain gauge stations, consistency of rainfall data (double mass curve method), computation of mean rainfall, estimation of missing data, presentation of precipitation data, moving average curve, mass curve, rainfall hyetographs.	**8 hrs**
Pedagogy	• Chalk and talk, PPT presentation • Problem Solving: encourages cognitive thinking and enables creative problem solving	
2	**Losses: Evaporation:** Introduction, Process, factors affecting evaporation, measurement using IS class-A Pan, estimation using empirical formulae (Meyer's and Rohwer's equations) Reservoir evaporation and control. **Evapo-transpiration:** Introduction, Consumptive use, AET, PET, Factors affecting, Measurement, Estimation by Blaney-Criddle equation. **Infiltration:** Introduction, factors affecting infiltration capacity, measurement by double ring infiltrometer, Horton's infiltration equation, infiltration indices.	**8hrs**
Pedagogy	• Chalk and talk, PPT presentation • 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	
3	**Runoff:** Definition, concept of catchment, factors affecting runoff, rainfall – runoff relationship using regression analysis. **Hydrographs:** Definition, components of hydrograph, base flow separation, unit hydrograph, assumption, application and limitations, derivation from simple storm hydrographs, S curve and its computations, Conversion of UH of different durations.	**8 hrs**
Pedagogy	• Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Chalk and talk, PPT presentation • Problem Solving: encourages cognitive thinking and enables creative problem solving	
4	**Irrigation :**	**8 hrs**

	Definition. Benefits and ill effects of irrigation. System of irrigation: surface and ground water, flow irrigation, lift irrigation, Bandhara irrigation. **Water Requirements of Crops:** Duty, delta and base period, relationship between them, factors affecting duty of water crops and crop seasons in India, irrigation efficiency, frequency of irrigation	
Pedagogy	• Problem Solving: encourages cognitive thinking and enables creative problem solving • Chalk and talk PPT presentation • Problem Solving: encourages cognitive thinking and enables creative problem solving	
5	**Canals:** Types of canals. Alignment of canals. Definition of gross command area, cultural command area, intensity of irrigation, time factor, crop factor. Unlined and lined canals. Standard sections. Design of canals by Lacey's and Kennedy's method. **Reservoirs:** Definition, investigation for reservoir site, storage zones determination of storage capacity using mass curves, economical height of dam.	**8 hrs**
Pedagogy	• Case studies: maps different domains in real time applications • Chalk and talk PPT presentation • 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	K. Subramanya, "Engineering Hydrology", Tata McGraw Hill Publishers, New Delhi
2	Jayarami Reddy, "A Text Book of Hydrology", Lakshmi Publications, New Delhi.
3	Punmia and LalPandey, "Irrigation and Water Power Engineering" Lakshmi Publications, New Delhi.
4	PN Modi " Irrigation and Water Resources & Water Power"
5.	Sharma R.K. & Sharma T.K. " Irrigation Engineering"
Reference Books	
1	H.M. Raghunath, "Hydrology", Wiley Eastern Publication, New Delhi.
2	Sharma R.K., "Irrigation Engineering and Hydraulics", Oxford & IBH Publishing Co., New Delhi.
3	VenTe Chow, "Applied Hydrology", Tata McGraw Hill Publishers, New Delhi.
4	Modi P.N "Water Resources and Water Power Engineering"-. Standard book house, Delhi.
5	Garg S.K, "Irrigation Engineering and Hydraulic Structures" Khanna publications, New Delhi.
6	Ganshyam Das " Hydrology and soil conservation Engineering
7	HM Raghunath " Hydrology (principle, analysis and Design)"

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 concepts of hydrology and Irrigation engineering components involved in water resources management.	**Understand/Remember**	**L1/L2**
CO2	Apply the knowledge of hydrological and irrigation concepts in estimating the essential factors like Evaporation, precipitation, crop yield etc to create a well balanced environment.	**Apply**	**L3**

CO3	Analyze the principles of hydrology and irrigation, to serve the immediate requirements of the filed of engineering in managing the natural resources and predicting the disasters.	**Analyse**	**L4**
CO4	Evaluate the situation based on present and past data, by conducting the statistical analysis and all engineering components with respect to hydrology and irrigation.	**Evaluate**	**L5**
CO5	Design the basic hydraulic and irrigation structures to protect and manage the natural resources.	**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	√				√									√	
CO3		√			√								√	√	
CO4			√		√								√	√	
CO5				√	√								√	√	

Weblinks and Video Lectures (e-Resources)	
1	https://archive.nptel.ac.in/courses/105/103/105103213/
2	https://onlineengineering.in/subject-wise/hydrology-irrigation-engineering
3	https://www.youtube.com/watch?v=CNWFTy_r_qU
4	https://web.ics.purdue.edu/~vmerwade/courses.html
5	https://libguides.mines.edu/hydrology/websites

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	15	15		
Apply	25	25		
Analyse	25	25		
Evaluate		15	25	25
Create		10	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	10				10		20	20
CO2		10		10			20	20
CO3	10		10		10		30	30
CO4					10	10	20	20
CO5						10	10	10
Total	20	10	10	10	30	20	100	

SEE- Semester End Examination (50 Marks):

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10
Understand	15
Apply	25
Analyse	25
Evaluate	15
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								
CO2								
CO3								
CO4								
CO5								
Total								

Semester	**:**	**6**				
Course Title	**:**	**Applied Geotechnical Engineering**				
Course Code	**:**	**BCV603**				
Course Type (Theory/ Practical/ Integrated)	**:**	**THEORY**				
Category	**:**	**PCC**				
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 learn Concepts and theories of soil mechanics to plan and execute geotechnical site investigation program
2	To examine engineering properties of soil using IS codes and theories of soil mechanics.
3	To assess the behavior of soil under anticipated stress coming from the civil structure.
4	To assess the soil condition and its suitability for proposed civil works by using engineering properties.
5	To use engineering properties of soil in designing soil structures and check their working conditions.

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)**.

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Soil Exploration:** Introduction, Objectives and Importance, Stages and Methods of exploration- Test pits, Borings, Sampling techniques, Undisturbed, disturbed and representative samples, Geophysical exploration and Bore hole log. Drainage and Dewatering methods, estimation of depth of GWT (Hvorslev's method).Concept of Soil Stabilisation	8
Pedagogy	**Seminar, Group Discussion, Poster presentation, Problem Solving**	
2	**Stress in Soils**: Introduction, Boussinesq's and Westergaard's theory - concentrated load, circular and rectangular load, equivalent point load method, pressure distribution diagrams and contact pressure, Newmark's chart Foundation Settlement - Approximate method for stress distribution on a horizontal plane, Types of settlements and importance, Computation of immediate and consolidation settlement	8
Pedagogy	**Poster presentation, Think Pair and Share, Case Studies**	
3	**Lateral Earth Pressure:** Active, Passive and earth pressure at rest, Rankine's theory for cohesionless and cohesive soils, Coulomb's theory, Rebhann's and Culmann's graphical construction. **Stability of Slopes :** Assumptions, infinite and finite slopes, factor of safety, use of Taylor's stability charts, Swedish slip circle method for C and C-Φ(Method of slices) soils, Fellineous method for critical slip circle	8
Pedagogy	**Problem Solving, Demonstration**	
4	**Bearing Capacity of Shallow Foundation:** Types of foundations, determination of bearing capacity by Terzaghi's and BIS method (IS: 6403), Effect of water table and eccentricity, field methods - plate load test and SPT Proportioning of shallow foundations- isolated and combined footings (only two columns) {Methods to improve bearing capacity}	8
Pedagogy	**Seminar, Poster presentation, Problem solving**	
5	**Pile Foundations:** Types and classification of piles, single loaded pile capacity in cohesionless and cohesive soils by static formula, efficiency of file group, group capacity of piles in cohesionless and cohesive soils, negative skin friction, pile load tests, Settlement of piles, under reamed piles (only introductory concepts – no derivation)	8
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	Soil Mechanics and Foundations, Punmia B.C,17th Edition,2017, Laxmi Publishing Co. New Delhi, ISBN-10: 8170087910.
2	Soil Engineering in Theory and Practice, Alam Singh and Chowdhary G.R, 2001, CBS Publishers and Distributiors ltd., New Delhi, ISBN 9788123900391
3	Basic and Applied Soil Mechanics, Gopal Ranjan and Rao ASR, 2016, New Age International (P) ltd, New Delhi, ISBN-10: 8122440398
4	Geotechnical Engineering, Braja, M. Das, Thomson Business Information India (P) Ltd., India.
5	Soil Mechanics and Foundation Engineering, VNS Murthy, 1 st Edition, 2015, UBS Publishers and Distributors, New Delhi, ISBN-10: 8123913621
6	Geotechnical Engineering, Narasimha Rao AV and Venkatramaiah C, 2015, University press, India ltd, Hyderabad, ISBN-10: 8173711453
Reference Books	
1	Soil Mechanics, T.W. Lambe and R.V. Whitman, John Wiley & Sons.
2	Geotechnical Engineering, Donald P Coduto, Phi Learning Private Limited, New Delhi
3	Geotechnical Engineering, Shashi K. Gulathi & Manoj Datta, Tata McGraw Hill Publications
4	Geotechnical Engineering, Debashis Moitra, Universities Press.,
5	Foundation analysis and design, Bowles J E , McGraw- Hill Publications.
6	A Guide to soil mechanics, Malcolm D Bolton, Universities Press.,

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** definitions, concepts and theories of Geotechnical engineering to plan site investigation to ascertain soil condition and profiling	Understand/Remember	L1/L2
CO2	**Apply** IS codal provisions and geotechnical engineering theories to find engineering properties of soil as a constructional material.	Apply	L3
CO3	**Analyze** the behaviour of soil under anticipated stresses applied from of civil structures against safety.	Analyse	L4
CO4	**Evaluate** the soil suitability for proposed civil engineering constructions.	Evaluate	L5
CO5	**Create** graphical constructions to check stability and performance of civil engineering structures situated on soil	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	APPLIED GEOTECHNICAL ENGINEERING (18CV62)
2	18CV62 Applied Geotechnical Engineering - VTUPulse.com
3	NPTEL :: Civil Engineering - NOC:Geotechnical Engineering II Foundation Engineering
4	NPTEL :: Civil Engineering - NOC:Geotechnical Engineering-II
5	NPTEL :: Civil Engineering - Advanced Geotechnical Engineering

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 2024-25)

Semester	:	**VI**				
Course Title	:	**Solid Waste and Air pollution Control Engineering / Integrated Solid Waste and Air pollution Control Engineering**				
Course Code	:	**BCV 634**				
Course Type (Theory/ Practical/ Integrated)	:	**THEORY**				
Category	:	**PEC-2**				
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 principles and importance of solid waste and air pollution in industrial and engineering environments.
2	To **familiarize** students with different sustainable solid waste management practices and air pollution control equipment and technologies..
3	To **equip** students with the ability to apply engineering methods and administrative strategies for managing solid waste and control air pollution
4	To **develop** the air quality and waste management systems using monitoring tools, modeling techniques, and relevant regulatory standards.
5	To **foster** awareness of environmental legislation, sustainability principles, and the importance of integrated waste and air pollution management in real-world applications

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 to solid waste management:** Sources: Sources of Solid waste, Types of solid waste, Physical and Chemical composition of municipal solid waste. Generation rate, Numerical Problems. Collection: Collection of solid waste- services and systems, equipment's, Transportation: Need of transfer operation, transfer station, transport means and methods, route optimization, Processing techniques: Purpose of processing.	8
Pedagogy	**Power point presentation, Chalk & talk, Seminar, Video demonstrations**	
2	Composting Aerobic and anaerobic method - process description, process microbiology, design consideration, Mechanical composting, Vermi composting, Numerical Problems. Sanitary land filling: Definition, advantages and disadvantages, site selection, methods, reaction occurring in landfill- Gas and Leachate movement, Control of gas and leachate movement, Design of sanitary landfill. Numerical Problems.	8
Pedagogy	**Power point presentation, Poster presentation, Think Pair and Share**	
3	Sources, collection, treatment and disposal :- Biomedical waste, E-waste, construction and demolition waste. Incineration -3Ts factor affecting incineration, types of incinerations, Pyrolsis, Energy recovery technique from solid waste management. Hazardous waste, Solid waste management 2000 rules with, 2016 amendments	8
Pedagogy	**Power point presentation, Poster presentation, Problem Solving, Site visit,**	
4	Definition, Sources, classification and characterization of air pollutants, Types of inversion, photochemical smog, plume behavior, wind rose diagrams, Plume Rise, estimation of effective stack height and mixing depths, Effects of air pollution on health, vegetation & materials.	8
Pedagogy	**Seminar, Poster presentation, Problem solving, Case Studies**	
5	Development of air quality models -Gaussian dispersion model Including Numerical problems, Particulate matter and gaseous pollutants- settling chambers, cyclone separators, scrubbers, filters & ESP -Including Numerical problems. Sampling of particulate and gaseous pollutants (Stack, Ambient & indoor air pollution), Site selection for industrial plant location.	8
Pedagogy	**Seminar, Video Demonstration, 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	George Tchobanoglous, Hilary Theisen , Samuel A Vigil, "Integrated Solid Waste Management : Engineering principles and management issues", M/c Graw hill Education . Indian edition
2	M.N. Rao and Razia Sultana," Solid and Hazardous Waste Management", Butterworth-Heinemann / Oxford University Press
3	M. N. Rao and H V N Rao, "Air pollution", Tata Mc-G raw Hill Publication.
4	H. C. Perkins, "Air pollution". Tata McGraw Hill Publication.
5	
Reference Books	
1	Municipal Solid Wastes (Management and Handling) Rules, 2000.Ministry of Environment and Forests Notification, New Delhi, the 25th September, 2000. Amendment – 1357(E) – 08-04-2016
2	Handbook of Solid waste management, second edition, George Tchobanoglous, Frank Kreith, published by M/c Graw hill Education, 2002, ISBN-13 978-0071356237 ISBN -10 0071356231
3	Noel De Nevers, "Air Pollution Control Engineering" , Waveland Pr Inc.
4	Anjaneyulu Y, "Text book of Air Pollution and Contr ol Technologies", Allied Publishers

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 concepts, terminologies, practices and regulations related to solid waste and air pollution	Understand	L1/L2
CO2	**Apply** integrated waste management and air pollution control approaches by selecting suitable treatment and disposal techniques for different real-world scenarios.	Apply	L3
CO3	**Analyze** the challenges, effectiveness, and sustainability of different waste management and air pollution control methods while considering environmental, economic, and regulatory factors.	Analyze	L4
CO4	**Evaluate** waste management policies, and air pollution control technologies, and their long-term impacts on urban development in both national and global contexts.	Evaluate	L5
CO5	**Investigate** integrated solid waste management practices and the air quality index and plume behavior for emission inventory sources.	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://archive.nptel.ac.in/courses/105/107/105107213/
2	https://archive.nptel.ac.in/courses/105/103/105103205/
3	https://www.youtube.com/watch?v=Nsi3R39V5q4&list=PLcwp2fRcIXJX8GJNev2Q818wW5qv-YdPE
4	https://www.youtube.com/watch?v=5dukz1UOtkA&list=PLLy_2iUCG87BwOQUbS7WSdMVWHDXByk-w

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	:	**VI**				
Course Title	:	**ADVANCED CONCRETE TECHNOLOGY & CONSTRUCTION TECHNIQUES**				
Course Code	:	**BCV614**				
Course Type	:	**THEORY**				
Category	:	**PCC**				
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 importance of various mix designs and quality control of concrete and to develop an advanced knowledge of durability and performance of cement concrete and how it can be controlled
2	To appreciate the importance of designing concrete mixtures for a multitude of diverse requirements including those of construction techniques, rheological, mechanical and durability performance requirements.
3	To design specialized concrete formulations.
4	To develop a comprehensive understanding of modern concrete construction techniques.

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	SPECIAL CONCRETES: Light weight aggregate concrete, Cellular concrete, No fines concrete, High Strength concrete, High performance concrete, Self-Compacting concrete – Mix proportions, mixing and casting methods, Mechanical properties, applications and limitations. Fibre reinforced concrete – Different types of fibres, Factors affecting properties of F.R.C, Polymer concrete – Types of Polymer concrete, Properties of polymer concrete, Foam Concrete, Bacterial Concrete	08
Pedagogy	Presentation, videos	
2	Design and manufacture of fiber reinforced concrete, Polymer concrete, Fly ash concrete	08
Pedagogy	Chalk and talk	
3	Design and manufacture of Self compacting concrete, High performance concrete, Very high strength concrete, High density concrete	08
Pedagogy	Chalk and talk	
4	Production Technology of Concrete- Ready Mix Concrete, Centrally Batched Concrete, Pre-mixed Materials, QA/QC Testing/Processes	08
Pedagogy	Presentation, videos, Case studies	
5	Construction Technologies- 3D Printing of Concrete, Tilt-up Construction, Insulated Concrete Forms, Under Water Concrete (Tremie Concrete), Slip-form Paving/Block Manufacturing, Precast/Prestressed Concrete, Pumping, Grouting/Shotcreting	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	Properties of Concrete by A.M.Neville, ELBS publications
2	Concrete Technology by M.S.Shetty, S.Chand & Co.
3	Concrete Technology byA.R.Santhakumar,2nd Edition, Oxford University Press.
4	Concrete Technology by M.L.Gambhir.–Tata Mc.Graw Hill Publishers, New Delhi
5	Krishna Raju. N, “Design of Concrete Mixes”, 2nd Edition, CBS Publishers and Distributors, 2009.
Reference Books	
1	Concrete: Micro Structure, Properties and Materials by P.K.Mehta andP.J.Monteiro,.Mc.Gr aw-Hill Publishing Company Ltd. New Delhi

2	Special Structural concretes by Rafat Siddique, Galgotia Publications 2000.
3	Concrete repair and maintenance illustrated- Peter H Emmons
4	Neville, A.M. and Brookes, J.J., "Concrete Technology", 2 nd Edition, Pearson Education, 2010.
5	Relevant Code of practice

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

- Nominate work specific concrete among the advanced ones learnt in class room teaching
- Assess the effect of ingredients towards quality of a given concrete mix.
- Control the quality of a mix by varying constituent materials quantity & quality
- Synthesis client & site specific RMC through knowledge of ACT

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	http://nptel.ac.in/syllabus/syllabus.php?subjectId=105104030

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the importance of durability of concrete in various environments	Understand/Remember	L1
CO2	Apply the diverse requirements of designing concrete mixtures and use of various special concrete	Apply	L2
CO3	Design concrete mix for different performances and requirements.	Design	L3
CO4	Evaluate the performances and effectiveness of modern concrete construction techniques in Civil engineering.	Evaluate	L4

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		
Design	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
Design	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

Semester	**:**	**6th SEM**				
Course Title	**:**	**Urban Transport Planning**				
Course Code	**:**	**BCV624**				
Course Type (Theory/Practical/ Integrated)	**:**	**THEORY**				
Category	**:**	**PEC**				
Stream	**:**	**HIGHWAY ENGINEERING**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:0:0**		**SEE**	**:**	**50**
Total Hours	**:**	**50**		**SEE Duration**	**:**	**3hrs**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the fundamental concepts, objectives, and scope of urban transport planning.
2	Conduct and analyze urban transport surveys using modern tools and data sources.
3	Apply various travel demand modeling techniques for trip generation, distribution, modal split, and assignment.
4	Interpret and apply urban transport system design principles including multimodal transport and land use interaction.
5	Evaluate and plan transport solutions for real-world urban scenarios considering sustainability and smart city concepts.

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	**Module 1: Introduction to Urban Transport Planning** • Urbanization and Transport: Challenges in Indian cities • Interdependence of Land Use and Transport • Urban transport problems and identification • Urban transport system planning process • System and modeling approaches • Transit-oriented development (TOD) • Role of NMT (Non-Motorized Transport) and shared mobility • Smart mobility and ITS overview	8
Pedagogy	**Chalk and talk with demonstration using models, site visits and software to validate results**	
2	**Module 2: Data Collection, Surveys and Inventories** • Study area delineation, zoning • Types of surveys: Home interview, roadside interview, commercial vehicle, cordon, screenline • Sampling techniques and expansion factors • Inventory of transportation facilities • Economic data collection: income, employment, vehicle ownership • Use of secondary and geospatial data • Data validation and analysis using GIS, Excel, and basic tools	8
Pedagogy	**Chalk and talk with demonstration using models, site visits and software to validate results**	
3	**Module 3: Trip Generation and Distribution** • UTPS (Urban Transport Planning System) framework • Trip purpose and influencing factors • Category analysis, zonal and household models • Trip attraction models, commercial trip generation • Growth factor methods for distribution • Desire lines and interpretation • Practical problems on trip generation and distribution	8
Pedagogy	**Chalk and talk with demonstration using models, site visits and software to validate results**	
4	**Module 4: Modal Split and Traffic Assignment** • Factors influencing modal choice • Modal split models: aggregate and disaggregate • Introduction to mode shift prediction (logit model) • Traffic assignment principles • Techniques: all-or-nothing, capacity restraint, incremental, equilibrium • Concept of diversion curves and travel time functions	8
Pedagogy	**Chalk and talk with demonstration using models, site visits and software to validate results**	

5	**Module 5: Land Use–Transport Interaction and Case Studies** • Land use–transportation feedback mechanisms • Land use transport models: Lowry, Garin-Lowry • Transport planning for small & medium Indian cities • Sustainable urban mobility planning (SUMP) • BRTS, Metro, and NMT case studies in India • Policy interventions and governance • Introduction to urban freight and logistics	**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	

Text Books:

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	L.R. Kadiyali, *Traffic Engineering and Transport Planning*, Khanna Publishers.
2	B.G. Hutchinson, *Principles of Urban Transport System Planning*, McGraw Hill.
3	C.J. Khisty & B. Kentlal, *Transportation Engineering – An Introduction*, PHI.
4	S.C. Sharma, *Urban Transport Planning and Modeling*, Khanna Publishers.
Reference Books	
1	Mayer M. & Miller E., *Urban Transportation Planning: A Decision-Oriented Approach*, McGraw Hill.
2	J.W. Dicky, *Metropolitan Transportation Planning*, Tata McGraw Hill.
3	A. G. Wilson, *Entropy in Urban and Regional Modeling*, Pion Ltd.
4	M.J. Bruton, *Introduction to Transportation Planning*, Hutchinson.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Conduct, organize, and analyze data from urban transport surveys.	Remembering Understanding	L1, L2
CO2	Apply models for forecasting travel demand including trip generation, distribution, modal split, and assignment.	Applying	L3
CO3	Integrate land use models with transport planning for comprehensive urban design.	Analyzing	L4
CO4	Analyze real-world urban transport case studies using planning principles and policy frameworks.	Evaluating	L5
CO5	Suggest sustainable and smart transport planning solutions for small, medium, and large cities.	Creating	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	3														
CO3		3												3	
CO4				3	3									3	
CO5			3									3	3		

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/
2	https://nptel.ac.in/courses/
3	https://nptel.ac.in/courses/
4	https://nptel.ac.in/courses/

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

	Marks Distribution		

CO's	Test-1			Test-2			Total Marks	Weightage
	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%

QUESTION PAPER BLUEPRINT (50 Marks – SEE, 3 Hours)

Module	Type of Questions	Bloom's Level	Marks
1	Concepts, TOD, System approach	L1–L3	10
2	Survey Design, Sampling, Data analysis	L2–L4	10
3	Trip generation/distribution problems	L3–L5	10
4	Modal split models, Traffic assignment	L3–L5	10
5	Land-use models, Policy and case studies	L2–L4	10

Question Type Mix:

- Theory (50%)
- Application-based (30%)
- Problem Solving / Case (20%)

WORKSHOP MODULE.

1. Urban Transport Survey Workshop

- **Duration**: 1 day
- **Activities**:
  - Hands-on: Roadside interview, vehicle count
  - Tools: Google Forms, Excel, GPS logging
  - Deliverable: Summary report of survey

2. Smart Mobility and ITS Application Demo

- **Duration**: Half day
- **Tools**: Presentation of apps like **Yulu**, **BMTC Route Planner**, **Google Transit**, **Traffic APIs**
- **Learning**: How tech is enabling multimodal integration and smart cities

3. GIS in Urban Planning Mini-Project

- **Duration**: 1 week (can be part of IA)
- **Software**: QGIS (free/open source)
- **Objective**: Map land use + traffic zones for small urban area
- **Output**: Printable map with analysis and zonal classification

4. Case Study Workshop: Bengaluru Metro & BRTS

- **Duration**: 2 Days
- **Session 1**: Guest Lecture (Metro official/Urban planner)
- **Session 2**: Students present analysis of system performance and land use impacts

Semester	:	**VI**				
Course Title	:	**FORMWORK DESIGN AND SHUTTERING**				
Course Code	:	**BCV644**				
Course Type	:	**THEORY**				
Category	:	**PCC**				
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 importance of formwork in concrete construction and to comprehend the basic principles and requirements of formwork.
2	To learn about different types of formwork systems and their applications.
3	To analyze loads, stresses and compute the bill of quantity for the formwork structures.
4	To understand the maintenance, safety considerations and best practices in formwork design and installation.

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 to Formwork: Definition and significance, Historical development, Importance in modern construction practices. Structural requirements, Functional requirements, Economical considerations. Advancement & Scope of formwork: Advance formwork Technologies available in market. Formwork Field as a Career option. Formwork planning and layout, Factors influencing formwork design: geometry, concrete properties, construction sequence, etc	08
Pedagogy	Presentation, videos	
2	Types of Formwork Systems: Traditional timber formwork, Engineered formwork systems (steel, aluminium, composite), Modular formwork systems, Climbing formwork, Slip form systems. Formwork Materials and Components: Common materials used in formwork construction (wood, steel, aluminium, etc.) Modular and Special formwork: Modular and Special formwork- Advantages and Limitations, Shuttering and de-shuttering, applications. Formwork accessories: ties, wedges, braces, etc., Selection criteria for formwork materials and components.	08
Pedagogy	Presentation, videos, Demonstration	
3	Structural Analysis for Formwork Design: Loads on formwork: dead load, live load, lateral pressure, etc., Principles of structural analysis for formwork systems, Calculation of formwork pressures and loads, BOQ Calculation and Checklist. Formwork cost estimation and optimization Schedule of formwork, Mobilization distribution, BOQ, Quantity Calculation, Cost optimization	08
Pedagogy	Chalk and talk	
4	Formwork Maintenance Importance of formwork maintenance in construction projects, Overview of common types of formwork deterioration, Formwork failure- Causes, design deficiency, safety in formwork, prevention of formwork failures. Impact of poor maintenance on safety, quality, and project schedule, Types of formwork inspections: pre-use, routine, and post-use inspections, Inspection checklist and documentation requirements, Identification of common defects and signs of deterioration. Routine Maintenance Practices, Inspection and replacement of damaged components, Repair Techniques for Formwork, Repair methods for different types of formwork materials, Patching and filling of surface defects. Strengthening and reinforcement of weakened or damaged formwork components.	08
Pedagogy	Presentation, videos	
5	Formwork building and erection, Formwork assembly for Wall & Column Panels, Equipment and Layout, Plant and Machinery, Formwork erection and safety, Inspection and Corrections, Plant and Machinery, Code and Contractual Requirements. Safety in Formwork Design: Hazards associated with formwork construction, Safety regulations and guidelines, Best practices in formwork design and construction, Case studies and examples of successful formwork projects.	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	**Jha, K.N., Formwork for Concrete Structures, First Edition, McGraw Hill. 2012**
2	**Robert L. Peurifoy and Garold D. Oberiender, Formwork for Concrete Structures, McGraw-Hill, 1996.**
3	**Hurd, M.K., Formwork for Concrete, 7th Edition, American Concrete Institute, 2005.**
4	**Austin, C.K., Formwork for Concrete, Cleaver–Hume Press Ltd., 1996.**
5	**Formwork - A guide to good practice, The Concrete Society, 3rd Edition, 2012.**
Reference Books	
1	**Guide to Formwork for Concrete (ACI 347-04), American Concrete Institute, 2004.**
2	**Michael P. Hurst, Formwork, Construction Press, 1997. 5. Robert Ratay, Temporary Structures in Construction, 3rd Edition McGraw Hill Professional, 2012.**
3	**Tudor Dinescu and Constantin Radulescu, Slipform Techniques, Abacus Press, 1992.**
4	**IS Codes:** **IS:456- 2000, Plain and Reinforced Concrete - Code of Practice** **IS:14687-1999, Guidelines for falsework for concrete structures, Bureau of Indian Standards, 1999.**

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	**Understand the basic principles and the various materials requirement for formwork**	**Understand/Remember**	**L1**
CO2	**Apply the knowledge on formwork and decide appropriate formwork materials and suitable formwork system.**	**Apply**	**L2**
CO3	**Analyse the loads on formwork and Estimate the bill of quantity and optimize the formwork cost**	**Analyze**	**L3**
CO4	**Evaluate the maintenances and safety in the Construction industry.**	**Evaluate**	**L4**

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

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			√		√				√					√	

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		
Analyse	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
Analyse	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

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)

Semester	:	VI				
Course Title	:	Occupational Safety and Health Engineering				
Course Code	:	BCV 645 / BCV615				
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 principles and importance of occupational health and safety in industrial and engineering environments.
2	To **familiarize** students with different types of occupational hazards, their sources, and techniques for hazard identification, risk assessment, and control.
3	To **equip** students with the ability to apply engineering methods and administrative strategies for preventing workplace accidents and illnesses
4	To **develop** the capability to analyze accident reports, conduct safety audits, and evaluate the effectiveness of safety programs.
5	To **provide** knowledge of national and international health and safety laws, codes, standards, and ethical responsibilities relevant to professional engineering practice.

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	**Occupational Hazard and Control Principles:** Safety, History and development, National Safety Policy, Occupational safety and Health Act (OSHA), Occupational Health and Safety administration - Laws governing OSHA and right to know. Accident – causation, investigation, investigation plan, Methods of acquiring accident facts, Supervisory role in accident investigation, Program Workers' Compensation - Unsafe Acts vs. Unsafe Conditions.	8
Pedagogy	**Power point presentation, Chalk & talk, Seminar, Video demonstrations**	
2	**Ergonomics at Work Place:** Ergonomics Task analysis, Preventing Ergonomic Hazards, Work space Envelops, Visual Ergonomics, Ergonomic Standards, Ergonomic Programs. Hazard cognition and Analysis, Human Error Analysis – Fault.	8

Pedagogy	**Power point presentation, Poster presentation, Think Pair and Share, Case Studies**	
3	**Fire Prevention and Protection:** Fire Triangle, Fire Development and its severity, Effect of Enclosures, early detection of Fire, Classification of fire and Fire Extinguishers. Electrical Safety, Standard and Lockout/ Tag out, Product Safety: Technical Requirements of Product safety.	**8**
Pedagogy	**Problem Solving, Video Demonstration, Case Studies**	
4	Health Considerations at Work Place: types of diseases and their spread, Health Emergency. Personal Protective Equipment (PPE)-types and advantages, effects of exposure and treatment for engineering industries, municipal solid waste. Environment management plans (EMP) for safety and sustainability.	**8**
Pedagogy	**Seminar, Poster presentation, Problem solving**	
5	Water and wastewater treatment plants, Handling of chemical and safety measures in water and wastewater treatment plants and labs, Construction material manufacturing industries like cement plants, RMC Plants, precast plants, and construction sites. Policies, roles and responsibilities of workers, managers and supervisors. Design based Problems (DP)/Open Ended Problem: Analysis of Compliance wrt OHS at different Industries/work places.	**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	Goetsch D.L, "Occupational Safety and Health for Technologists", Engineers and Managers Prentice Hall, 1999.
2	Heinrich H.W, "Industrial Accident Prevention-A Scientific Approach", McGraw-Hill Book Company, 2007.
3	Industrial Safety and Pollution Control Handbook.
Reference Books	
1	Colling D.A., "Industrial Safety Management and Technology", Prentice Hall, 1990.
2	Della D.E. and Giustina Van Nostrand Reinhold, "Safety and Environmental Management", 1st Edition 1996.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** fundamental concepts, importance, and scope of occupational safety and health administration (OSH) in engineering and industrial settings.	Understand	L1/L2
CO2	**Apply** the concept of OSH engineering and administrative control strategies to design safer work environments and reduce the risk of occupational injuries and illnesses.	Apply	L3
CO3	**Analyze** OSHE accident data, conduct safety audits and risk assessments, and effectiveness of existing safety systems and protocols.	Analyze	L4
CO4	**Evaluate** safety management systems, workplace layouts, and engineering controls to minimize occupational hazards and ensure compliance with safety regulations.	Evaluate	L5
CO5	**Design** workplace accidents or unsafe conditions using systematic techniques such as root cause analysis, and suggest corrective and preventive actions.	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://www.cdc.gov/niosh/index.htm
3	https://youtu.be/8nbOI-0U9Co
4	https://youtu.be/Be9inw8xlw8
5	https://www.slideshare.net/engkhanmsh/introduction-to-osha-50289682

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

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Semester	:	**VI**				
Course Title	:	**Geotechnical Engineering Laboratory**				
Course Code	:	**BCV606**				
Course Type (Theory/ Practical/ Integrated)	:	**Practical (LAB)**				
Category	:	**PCCL**				
Stream	:	**Civil**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:0**		**SEE**	:	**50**
Total Hours	:	**20**		**SEE Duration**	:	**03**
Credits	:	**02**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Enable students to determine index properties of soils such as moisture content, specific gravity, Atterberg limits, and grain size distribution for classification and identification of different soil types.
2	Familiarize students with testing methods to evaluate soil compaction characteristics, permeability, shear strength, and consolidation behavior essential for geotechnical analysis and design.
3	Train students to record, analyze, and interpret soil test results, correlating laboratory findings with field behavior of soils in foundation, embankment, and slope stability problems.
4	Inculcate a thorough understanding of IS code procedures, calibration techniques, and safe laboratory practices to ensure accuracy and reliability in geotechnical testing.

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)**.

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Specific gravity test(pycnometer and density bottle method).Water content determination byoven drying method	CO1
2	Grain Size Analysis Sieve Analysis	CO3
3	In-situ density tests Core-cutter method Sand replacement method	CO3
4	Consistency limits Liquid limit test (by casagrande's and cone penetration method) Plastic limit test	CO3
5	Standard compaction test(light and heavy compaction)	CO3
6	Co-efficient of permeability test Constant head test Variable head test	CO3
7	Shear strength tests Unconfined compression test Direct shear test Triaxial test (unconsolidated undrained test only)	CO3
8	Consolidation test: to determine preconsolidation pressure only(half an hour perloadingtest).	CO4
Demonstration Experiments		
9	Field identification of soil	CO4
10	Hydrometer analysis	CO4
11	Rapid moisture-meter method.	CO4
12	Shrinkage limit test,	CO4
13	Swell pressure test,	CO4
14	Standard penetration test and boring equipment	CO4
15	laboratory vane shear test	CO4
Open ended Programs		
1	*"Evaluate the suitability of local soil for highway subgrade construction."* Students collect soil samples from nearby areas and determine whether they meet MORTH specifications for subgrade performance.	CO5

2	*Design a soil improvement strategy for a weak foundation soil using lab test results."* Based on compaction, permeability, and shear strength tests, students propose suitable stabilization methods (e.g., lime, fly ash, geotextiles).	**CO5**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	"Laboratory Testing of Soils for Civil Engineering Purposes" by T.S. Nagaraj and K.S. Ramaswamy
2	**IS Codes – Bureau of Indian Standards (BIS)** *IS 2720 series* (Part 1 to 40) – Official standard test methods for various soil properties (e.g., compaction, shear, permeability).
Reference Books	
1	**"Soil Testing for Engineers" – T.W. Lambe** A practical manual focusing on experimental methods, procedures, and interpretation of soil test results.

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	Recall the fundamental definitions and explain the significance of basic soil properties and laboratory tests.	**Understand/ Remember**	**L1**
CO2	Perform laboratory tests to determine index and engineering properties of soils using standard procedures.	**Apply**	**L2**
CO3	Analyze and classify soils based on laboratory test data and relevant IS classification systems.	**Analyze**	**L3**
CO4	Evaluate experimental results to assess soil behavior and recommend suitable geotechnical applications.	**Evaluate**	**L4**
CO5	Design simple soil improvement or foundation strategies based on test data and practical constraints	**Create**	**L6**

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

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			√		√			√						√	
CO5				√	√			√						√	

Weblinks and Video Lectures (e-Resources)	
1	https://youtu.be/3wAh28UPxHI?si=i_VPaEnfNZclEMDp
2	https://youtu.be/5p01O5rEFTI?si=npiHj6gsSrEWpS2L

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 (CIE):

CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40. Total marks scored by the students for record are scaled down to 30 marks (60% of maximum marks). The suitable rubrics can be designed to evaluate each student's performance and learning ability. The marks scored in test shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Examination:

SEE will be conducted by University as per the scheduled timetable in cad laboratory in batches, with common question papers for each batch. The question paper shall be set for 100 marks. The medium of the question paper shall be English. The duration of SEE is 03 hours. The question paper will have two parts. Part A will have questions from analysis and application s in excel. Part B will have questions from design. The students have to answer one full question out of two full questions from each part.

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				
Apply				
Analyse				
Evaluate				
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								
CO2								
CO3								
CO4								
CO5								
Total								

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	
Apply	
Analyse	
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								
CO2								
CO3								
CO4								
CO5								
Total								

Dayananda Sagar Academy of Technology & Management

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se Learning Objectives: Students will be able to:

Semester	**:**	**VI**				
Course Title	**:**	**GIS and RS**				
Course Code	**:**	**BCV608**				
Course Type (Theory/ Practical/ Integrated)	**:**	**SDC**				
Category	**:**					
Stream	**:**	**CVL**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**1:0:2:0**		**SEE**	**:**	**50**
Total Hours	**:**	**35**		**SEE Duration**	**:**	**03**
Credits	**:**	**02**				

Sl. No	Course Objectives
1	Understand the principles, applications, trends, and pertinent issues of geographical information systems and sciences, including remote sensing (RS), Photogrammetry, cartography, and global positioning systems (GPS).
2	Develop applications of environmental remote sensing and GIS which can directly enhance service delivery on land use management, ground water management/prospects, agriculture, forestry, food and water security, disaster management, etc.
3	Gain an understanding of how to manipulate and apply vector and raster spatial data, particularly with regard to local/state/national issues, emphasizing lands in and near it.
4	Describe how geographical information is essential in the present scenario , managed, and marketed globally.
5	Design the projects to deal with real world problems.

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)**.

List of Programs:

Sl. No.	Experiments/Programs	Duration	COs
1	Defining the Raster and vector Data and Exposure	3hrs	CO1
2	Conversion of a village map from raw format to GIS format and shape file	3hrs	CO2
3	Creation of Attribute table and a small exercise for a country with an application	3hrs	CO3
4	Analyzing the vector data (any road map or traffic mapping)	3hrs	CO3
5	Vector data and importance , with applications on a project by digitization	3hrs	CO2
6	Point data, line data and polygon data analysis by every individual student	3hrs	CO3
7	Working on a small environmental problem with the above knowledge	3hrs	CO3
8	Working on a small water related project with the gained knowledge	3hrs	CO4
9	Introduction to Remote sensing software	3hrs	CO1
10	Image Enhancement: Landsat image Image Rectification: Landsat Image	3hrs	CO1 CO1
11	Unsupervised Classification: Nearest neighborhood classification Supervised Classification: Landsat Image	3hrs	CO2 CO2
12	Object-Based Image Analysis (picking any specific area)	3hrs	CO3
13	Evaluate the image of historical and present analysis Evaluate the techniques in combination both GIS layers and RS. `	3hrs	CO4 CO4
	Open ended Programs		
1	Design a small project with respect to environmental factors		CO5
2	Design a small project with respect to water resources Management		CO5
3	Design a Solution for any solid waste management.		CO5
4	Design a solution for any traffic issue in the city		CO5

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Concept and Techniques of GIS by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers
2	Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth Resource Perspective. Prentice Hall.
3	Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley
4	Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag
Reference Books	
1	Digital Image Processing (3rd Edition) Rafael C. Gonzalez, Richard E. Woods Prentice Hall, 2007.
2	Drury, S.A., 1987: Image Interpretation in Geology. Allen and Unwin
3	Sabbins, F.F., 1985: Remote Sensing Principles and interpretation. W.H.Freeman and company
4	Joseph George, 2003: Fundamentals of Remote Sensing. Universities Press
5	Pratt.W.K. 2004: Digital Image Processing. John Wiley
6	Nag P. and Kudrat M. 1998: Digital Remote Sensing. Concept Publication

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand and Develop models for GIS spatial Analysis and image processing using RS .	L1/L2	Understand
CO2	Apply knowledge of GIS software and able to work with GIS software in various application fields	L3	Apply
CO3	Analyze spatial and non spatial data features in GIS to understand the map projections and coordinates systems	L4	Analyze
CO4	Evaluate the several factors using GIS to protect the environment safe and achieve a sustainable global environment.	L5	Evaluate
CO5	Design the evolutionary solutions in various streams of civil engineering and to provide the precise solutions	L6	Create

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
1	https://ncscm.res.in/remote-sensing-gis-lab/
2	https://www.itc.nl/facilities/remote-sensing-and-gis-lab/
3	https://nerist.ac.in/research-laboratory/laboratory-7-remote-sensing-and-gis/
4	https://www.geotree.uni.edu/en/resources/gis-gps-and-rs-links/
5	https://www.umt.edu/spatial-analysis-lab/resources/rs-gis-links/

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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					
Understand					
Apply					
Analyse					
Evaluate					
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								
CO2								
CO3								
CO4								
CO5								
Total								

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan:

	Marks Distribution		

CO's	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5	Total Marks	Weightage
CO1								
CO2								
CO3								
CO4								
CO5								
Total								