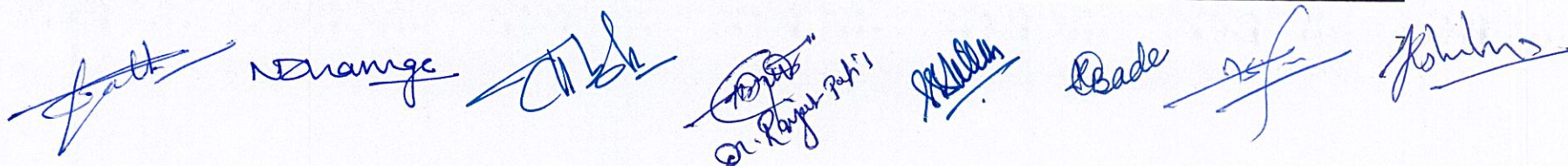## B.Tech. Sem – III (Civil Engineering-Major)

SN	Course Category	Course Code	Name of Course	BoS	Teaching Scheme (hrs.)			Total Credit	Examination Scheme							
									Theory				Practical			
					(Th)	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.	
1	PCC-II	BCV3T09	Strength of Materials	Civil	3	-	-	3	3	70	30	45	-	-	-	
2	PCC-II	BCV3P09	Strength of Materials Lab	Civil	-	-	2	1	-	-	-	-		50	25	
3	PCC-III	BCV3T10	Concrete Technology	Civil	3	-	-	3	3	70	30	45	-	-	-	
4	PCC-III	BCV3P10	Concrete Technology Lab	Civil	-	-	2	1	-	-	-	-	25	25	25	
5	MDM-I	BMD3T11	Computer Programming by Python	Civil	2	-	-	2	3	70	30	45	-	-	-	
6	OE-I	BOE3T01	Open Elective – I Refer OE Basket	Civil	3	-	-	3	3	70	30	45	-	-	-	
7	OE-I	BOE3P01	Open Elective – I Lab Refer OE Basket	Civil	-	-	2	1	-	-	-	-	25	25	25	
8	HSSM-I	BHM3T01	Entrepreneurship in Civil Engineering	Civil	2	-	-	2	3	70	30	45	-	-	-	
9	VEC-I	BVE3T01	Constitution of India	ASH	2	-	-	2	3	70	30	45	-	-	-	
10	CEP	BCE3P01	Community Project/Mini Project	Civil	-	-	4	2	-	-	-	-	50	50	50	
			Total		15	-	10	20		420	180		100	150		

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B.TECH. CIVIL ENGINEERING

Sem: III	Total Hours Distribution per week	
Total Credit : 3	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BCV3T09	Strength of Materials
Examination Scheme			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

Course Objectives:

1.	To determine the various mechanical properties of the materials.
2.	To determine the shear force and bending moment at a section for different condition.
3.	To facilitate the concept of bending and its theoretical analysis in a beam to determine the bending and shear stress in a given beam.
4.	To develop slope and deflection equations for beams subjected to various loads.
5.	To determine the torsion in circular section, direct and bending stresses.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Explain the basic concept and mechanical properties of materials.
2	Calculate and draw Shear Force diagram and Bending Moment diagram and their relation.
3	Formulate the bending and shear stresses equations and able to draw bending and shear stress diagram.
4	Formulate slope and deflection equations for beams subjected to various loads by macaulay's method.
5	Analyze and evaluate the torsion in circular section, direct and bending stresses.

SYLLABUS

Details of Topic	Allotment of hours		Mapped with CO Number
UNIT I: STRESS AND STRAIN	**L**	**T**	
Concept of stress and strain, stress strain diagrams and their characteristics for mild steel and TOR steel, stresses and strains in simple, compound and composite bars in uniaxial tension and compression, temperature stresses in simple restrained composite bar, elastic constants and relation between them.	7	--	01

UNIT II: SHEAR FORCE AND BENDING MOMENT			
Types of beams, axial force, shear force and bending moment, relation between load intensity, Shear Force and Bending Moment, Shear Force and Bending Moment diagrams of simply supported and cantilever beams.	7		02
UNIT III: STRESS IN BEAMS			
Bending stresses in beams, assumptions and derivation of simple bending theory, relation between bending moment, bending stress and curvature of homogeneous and composite beams, shear stresses in simple beams, shear flow and shear stress distribution, shear stress in composite beams, combined effect of bending moment and axial force, introduction to principal stresses, maximum shear stresses.	7		03
UNIT IV: DEFLECTION OF BEAMS			
Differential equations of the deflection curve, bending of uniformly loaded beams, deflection of simply supported beams loaded concentrated beam, introduction to Macauley's method, deflection of a simply supported and cantilever beam by the Macauley's method, method of superposition, the deflection of beams with overhangs.	6		04
UNIT V: TORSION, DIRECT AND BENDING STRESS			
Direct and bending stress, introduction to torsional rigidity, assumptions and derivation of relations between torsional moment, shear stress and angle of twist, torsion in thin-walled hollow section, closely coiled helical springs.	6		05

List of Books:
Text Books:
1. Strength of materials, S. Ramamrutham, 17, Dhanpat Rai Publication
2. Strength of materials, R. S. Khurmi, S. Chand Publication
3. Strength of materials, Subramanian R., CBS Publishers and Distributors.

Reference Books:
1. Strength of Materials, F. L. Singer, Haper and Row.
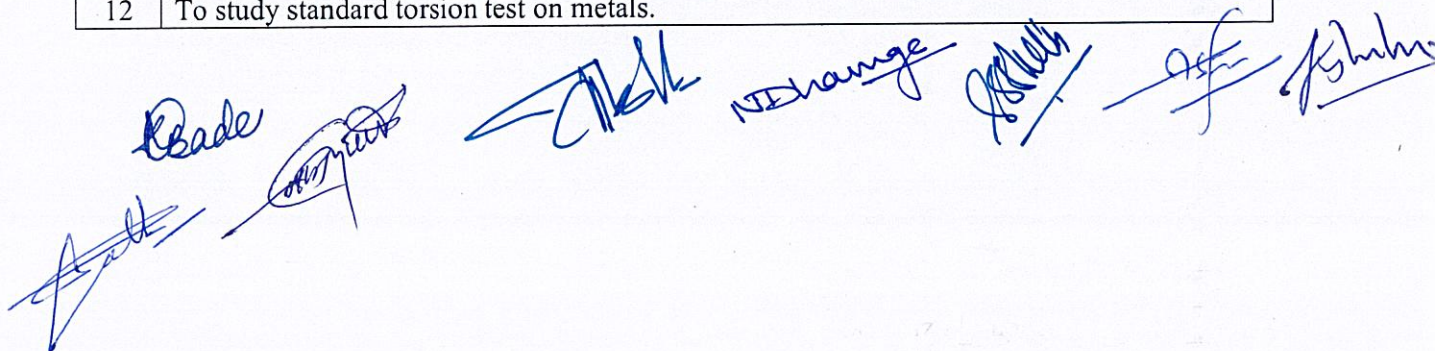2. Strength of material, R. K. Bansal, Laxmi Publication.

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B.TECH. CIVIL ENGINEERING

Sem: III	Total Hours Distribution per week	
Total Credit :1	Practical (P): 2 Hrs.	
Subject Code	BCV3P09	Strength of Materials Lab
Examination Scheme – Practical		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
50 Marks	--	25 Marks	--

List of Experiments:
1) The practical are based on theory subject of Strength of Materials and CO's.
2) Minimum eight practical shall be performed from list of experiments.
3) Any one practical may be performed using virtual lab.

Exp. No.	List of Experiments
1	To study the universal testing machine.
2	To determine the tensile strength of steel specimen.
3	To determine flexural strength of timber beam.
4	To determine modulus of rigidity of m.s. bar by torsion test.
5	To determine impact value of metal by Charpy impact test or Izod impact test.
6	To determine Rockwell hardness number for m.s. And aluminium bar.
7	To determine the stiffness of spring and modulus of rigidity.
8	To determine the compressive strength of specimen.
9	To perform shear test on different metals.
10	To perform bending test on wooden beam and find its flexural rigidity.
11	To study various types of strain gauge apparatus.
12	To study standard torsion test on metals.

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B.TECH. CIVIL ENGINEERING

Sem: III	Total Hours Distribution per week	
Total Credit : 3	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BCV3T10	Concrete Technology
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours
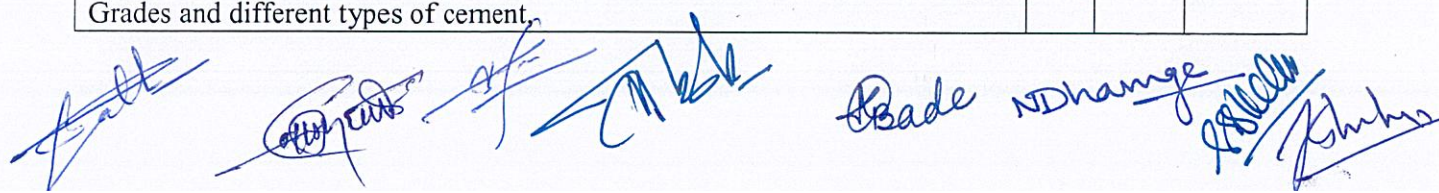
Course Objectives:

1.	Analyze the properties and behavior of concrete constituents including cement, aggregates, and water, and their significance in determining the properties of concrete.
2.	Design and proportion concrete mixes using various methods (IS, BS, and ACI) to produce concrete mixes that meet specific requirements, taking into account factors such as strength, workability, and durability.
3.	Evaluate the properties and performance of fresh and hardened concrete including assessment of workability, strength, durability, and identification of factors that affect its performance, such as environmental conditions, admixtures, and additives

Course Outcomes	
After completion of syllabus, students would be able to	
1	Explain the properties of the constituent materials of concrete.
2	Examine the properties of fresh concrete and tests to determine these properties.
3	Examine the properties of hardened concrete and tests to determine these properties.
4	Analyse the concrete mix design and apply statistical quality control techniques.
5	Explain admixtures, their role in concrete properties.

SYLLABUS

Details of Topic	Allotment of hours		Mapped with CO Number
UNIT I: Cement And Aggregate	L	T	
Cement: Constituents of cements, Hydration of cement. Water requirement, Physical properties and testing of cement. Effect of fineness, Initial and final setting of cement, Soundness test. Hardening and compressive strength, Grades and different types of cement.	8		01

Aggregates: Coarse and fine aggregate, normal, light and heavy weight aggregates. Aggregate characteristics and their significance in properties of concrete. Sampling, Particle shape and texture, Bond of aggregate, size & grading of aggregate, strength of aggregate. Mechanical properties and tests, Bulking of sand, Crushed sand, Alkali aggregate reaction. **Water:** Minimum requirement of water for mixing.			
UNIT II: FRESH CONCRETE			
Batching, Mechanical mixers, automatic batching and mixing plants. Efficiency of mixing, Workability and its Measurement, Factor affecting workability, Significance of w/c ratio, cohesiveness of concrete, segregation, bleeding, voids, permeability, Conveyance of concrete, placing of concrete, compaction, curing of concrete, significance and methods, temperature effects on curing and strength gain, Maturity of concrete, Formwork for concrete. Hot and cold weather concreting, Introduction to Ready mix, pumped and self-compacting concrete.	7		02
UNIT III: STRENGTH OF CONCRETRE			
Strength gain, factors affecting compressive strength, Tensile and flexural strengths, relation between compressive and tensile strength. Failure modes in concrete, cracking in compression. Impact strength, fatigue strength, shear, elasticity, Poisson's ratio. **Testing of Hardened Concrete:** Compression test, cube strength and cylinder strength and their relation, effect of aspect ratio on strength. Flexural strength of concrete, determination of tensile strength, indirect tension test, splitting test, accelerated curing test. **Non Destructive Test:** Significance, rebound hammer, ultra-sonic pulse velocity test.	7		03
UNIT IV: Mix Design			
Objectives of mix design, Process, statistical relation between mean and characteristic strength, variance, standard deviation, factors affecting mix properties, grading of aggregates, water/cement ratio etc. Degree of quality control, design of mix by IS method, introduction to road Note No. 4 (BS) and ACI method.	7		04
UNIT V: Additives and Admixtures			
Types of admixtures, natural products, diatomaceous earth, calcined clays of shales, volcanic glasses, by-products–pozzolana, fly ash, silica fume, rice husk ash, metakaolin, G.G. blast furnace slag, admixtures- air entraining, water reducing, accelerators, retarders, plasticizers and superplasticizers, permeability reducing, grouting agents, surface hardeners. **Shrinkage :** Early volume changes, drying shrinkage, mechanism and factors affecting shrinkage, influence of curing conditions, differential shrinkage, carbonation, creep- factors influencing, relation between creep and time, nature of creep, effect of creep.	7		05

Text Books:

1. Gambhir M.L: Concrete Technology Tata McGraw Hill (Second Edition) 1995.Structural
2. M.S. Shetty, Concrete Technology S. Chand & Company New Delhi 2005.

Reference Book:

1. P. Kumar Mehata, Paulo & J.M. Monteiro, Concrete microstructure, properties & materials, Prentice Hall INC & Mcgraw Hill USA.
2. Short & Kenniburg, Light Weight Concrete, Asia Publishing House, Bombay 1963.
3. Chen Orchard D.F.; Concrete Technology-Vol I. & II Applied Science Publishers (Fourth Edition) 1979
4. Neville A.M., J.J. Brook Properties of Concrete Addison Wesley 1999.
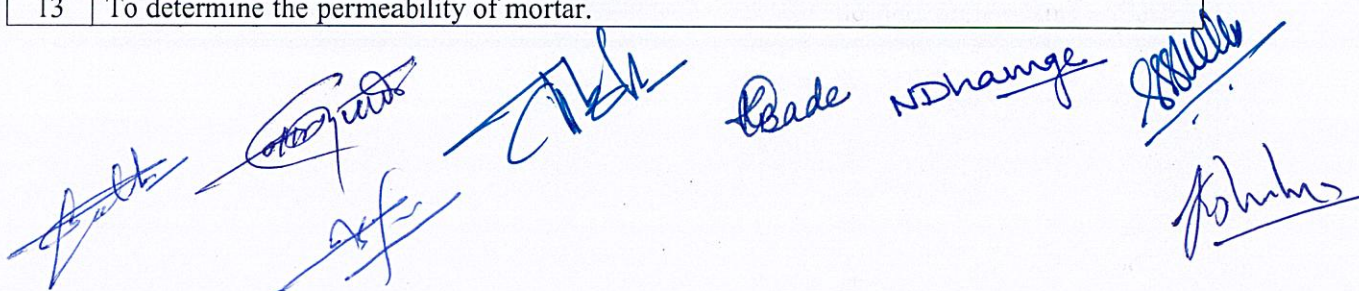
RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. CIVIL ENGINEERING

Sem: III	Total Hours Distribution per week		
Total Credit :1	Practical (P): 2 Hrs.		
Subject Code	BCV3P10	Concrete Technology Lab	
Examination Scheme – Practical			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
25 Marks	25 Marks	25 Marks	--

List of Experiments:
1) The practical are based on theory subject of Concrete technology and CO's.
2) Minimum eight practical shall be performed from list of experiments.
3) Any one practical may be performed using virtual lab.

Exp. No.	List of Experiments
1	To determine the normal consistency and initial setting time and final setting time by Vicat's apparatus.
2	To determine the fineness of cement.
3	To perform soundness test of cement.
4	To determine fineness modulus for coarse and fine aggregates.
5	To determine the bulking of sand.
6	To determine the compressive strength of cement.
7	To design the concrete mix of required characteristic strength according to I.S. method.
8	To determine the workability of concrete by slump cone, Vee bee apparatus, compaction factor and flow test.
9	To prepare and test the concrete cubes for compressive strength by Indian standard method.
10	Study and performance of various Non-Destructive testing methods (NDT) in concrete technology
11	To determine workability of cement mortar.
12	To determine the permeable voids of concrete
13	To determine the permeability of mortar.

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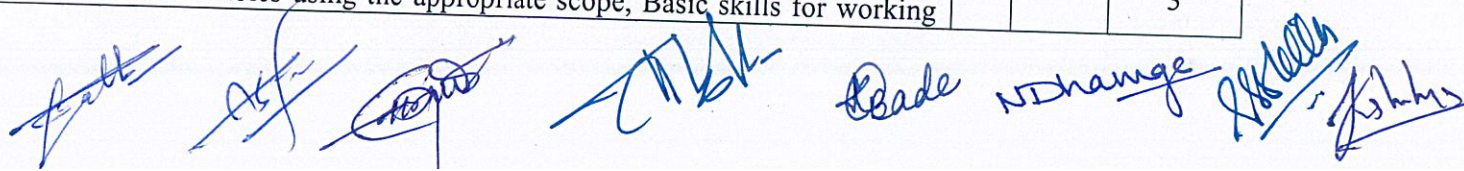## FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. CIVIL ENGINEERING

Sem: III	Total Hours Distribution per week		
Total Credit : 2	Lecture (L): 2 Hrs	Tutorial/Activity (T/A): 0 Hr.	
Subject Code	BMD3T11	Computer Programming by Python	
Examination Scheme			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

Course Objectives

1	To learn python basic operations and data structures
2	To build applications using python and its libraries

Course Outcomes

After completion of syllabus, students would be able to	
1	Understand and practice python environment and basics of python
2	Write program based on control structures and various data structures
3	Write modular programs using functions and modules
4	Use files as input and output data to programs and graphics

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Unit 1: Introduction, Data Types and Operators			
Installation and working with Python, Variables and data types in python, Perform computations and create logical statements using Python's operators: Arithmetic, Assignment, Comparison, Logical, Membership, Identity, Bitwise operators, list, tuple and string operations	6		1
Unit 2: Python Decision making and Loops			
Write conditional statements using If statement, if ...else statement, elif statement and Boolean expressions, While loop, For loop, Nested Loop, Infinite loop, Break statement, Continue statement, Pass statement, Use for and while loops along with useful built-in functions to iterate over and manipulate lists, sets, and dictionaries. Plotting data, Programs using decision making and loops.	6		2
Unit 3: Python Functions and Modules			
Defining custom functions, Organising Python codes using functions, Create and reference variables using the appropriate scope, Basic skills for working	6		3

with lists, tuples, work with dates and times, get started with dictionaries, Importing own module as well as external modules, Programming using functions, modules and external packages			
Unit 4: File Operations & Graphics			
An introduction to file I/O, use text files, use CSV files, use binary files, Introduction to matplotlib.pyplot, plotting text, values, lines, markers, axes, circles, polygones, arrows.	6		4

Text/Reference Books:

1) John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
2) Python Programming Fundamentals- A Beginner's Handbook by Nischay kumar Hegde
3) Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication
4) Introduction to Python for Engineers and Scientists, By. Sandeep Nagar, Apress
5) MicroPython for the Internet of Things (A Beginner's guide to programming with Python on microcontrollers) By. Charles Bell, Apress
6) Python for Civil and Structural Engineers: Vittorio Lora, Independently published, 2019.
7) Python Programming Using Problem Solving Approach: Reema Thareja, Oxford University, Press; First edition.
8) Learning Python: Powerful object-oriented programming, Mark Lutz, O'REILLY publications 5th addition.
9) Introduction to Computing & Problem Solving with Python Jeeva Jose and P Sojan Lal Ascher.
10) Problem Solving with Algorithms and Data Structures using Python by Brad Miller and David Ranum, 2nd addition.
11) Allen Downey, Jeffrey Elkner, Chris Meyers, Learning with Python, Dreamtech Press
12) David M. Baezly "Python Cookbook" O'Reilly Media; Third edition, 2013.

Online Learning Platform

1. **Swayam:** Programming in Python https://onlinecourses.swayam2.ac.in/cec23_cs14/preview
2. **Coursera:** Programming for Everybody (Getting Started with Python) https://www.coursera.org/learn/python?specialization=python
3. **edX:** The University of Michigan: Programming for Everybody (Getting Started with Python)

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. CIVIL ENGINEERING

Sem: III	Total Hours Distribution per week	
Total Credit : 3	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BOE3T01	Open Elective - I
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

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Sem: III	Total Hours Distribution per week	
Total Credit :1	Practical (P): 2 Hrs.	
Subject Code	BOE3P01	Open Elective - I Lab
Examination Scheme – Practical		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
25 Marks	25 Marks	25 Marks	--

NOTE: For BOE3T01and BOE3P01, refer OE Basket other than OE offered by Civil Engg Board

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B.TECH. CIVIL ENGINEERING

Sem: III	Total Hours Distribution per week	
Total Credit : 2	Lecture (L): 2 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BHM3T01	Entrepreneurship in Civil Engineering
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

Course Objectives

1	To learn concepts of entrepreneurship and startups
2	To explore funding and leanings from case studies.
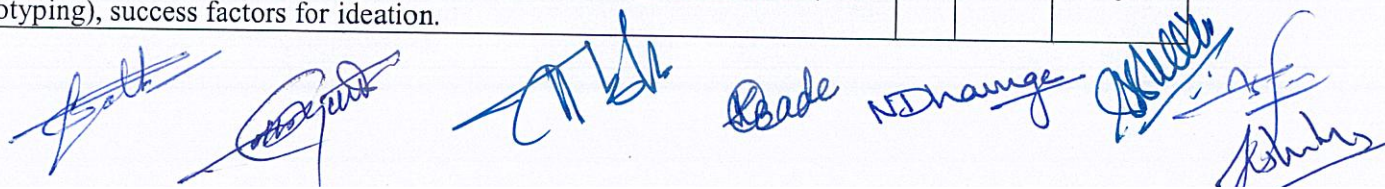
Course Outcomes

After completion of syllabus, students would be able to

1	Understand a know-how on entrepreneurship development
2	Acquire the knowledge of various types of startups
3	Understand the concept of ideation
4	Apply knowledge for the funding for startups

SYLLABUS
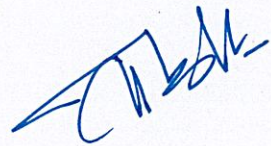
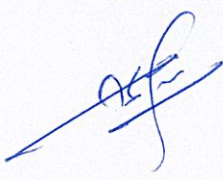| Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Unit 1: Introduction to Entrepreneurship			
Concept of entrepreneurship, characteristics of an Entrepreneur, types of Entrepreneurship, Functions of Entrepreneurs, Women entrepreneurship in India, Problems and challenges of women entrepreneurs, Government's support system to develop women entrepreneurship.	6		1
Unit 2: Basics of Startups			
Concept of startup, Types of startups: Scalable startup, small business startup, lifestyle startup, buyable startup, social startup, big business startup, Startup ecosystem	6		2
Unit 3: Ideations			
Concept of ideation, ideation process, idea incubation, design thinking approach, ideation techniques (brainstorming, sketching, SCAMPER, and prototyping), success factors for ideation.	6		3

Unit 4: Funding			
Funding for startups, angel funding, venture funding, difference between angel and venture funding, private equity fund, ownership of startups, causes of startups failures, Startup success case studies: Instagram, Linkedin, Snapchat, Whatsapp	6		4

Text/Reference Books:

1. Entrepreneurial Development By, S. S. Khanka S. Chand & Co. Ltd. New Delhi, 1999.
2. Entrepreneurial Development. By, S.Anil Kumar. New Age International.
3. Small- Scale Industries and Entrepreneurship, By, Dr. Vasant Desai, Himalaya Publication.
4. Industrial Economics and Entrepreneurship development by A.M. Sheikh, Nawaz Khan & M.A. Tongo, S Chand Publication

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B.TECH. CIVIL ENGINEERING

Sem: III	Total Hours Distribution per week	
Total Credit : 2	Lecture (L): 2 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BVE3T01	Constitution of India
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

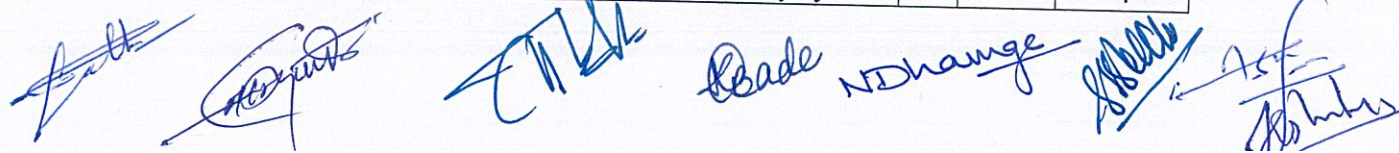|	Course Objectives
1	To provide engineering students with a foundational understanding of the Indian Constitution, its principles, and its relevance to their professional and civic responsibilities

	Course Outcomes
	After completion of syllabus, students would be able to
1	Analyze the basic structure of Indian Constitution.
2	Remember the Fundamental rights and duties.
3	Know DPSP's and Nation's political structure.
4	Understand function of Parliament and Judiciary.

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Unit 1			
Introduction to the Indian Constitution, Preamble of the Indian Constitution and key concepts, Salient features of the Indian Constitution, Role and objective of Constituent Assembly.	6		1
Unit 2			
Fundamental rights meaning, significance, restrictions and limitations Fundamental duties and its scope, difference between Fundamental rights and Fundamental duties	6		2
Unit 3			
Directive Principles of State Policy (DPSP's) and its present relevance in India, Union Executive- President, Prime Minister and Union cabinet.	6		3
Unit 4			
Parliament - role and function, Lok Sabha and Rajya Sabha, Judiciary system	6		4

in India, Supreme Court of India and other courts.			

Text/Reference Books:

1. Introduction to the Constitution of India by D D Basu.
2. Outlines of Indian Legal and Constitutional History   by M P Jain.
3. Constitution of India by P M Bakshi

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B.TECH. CIVIL ENGINEERING

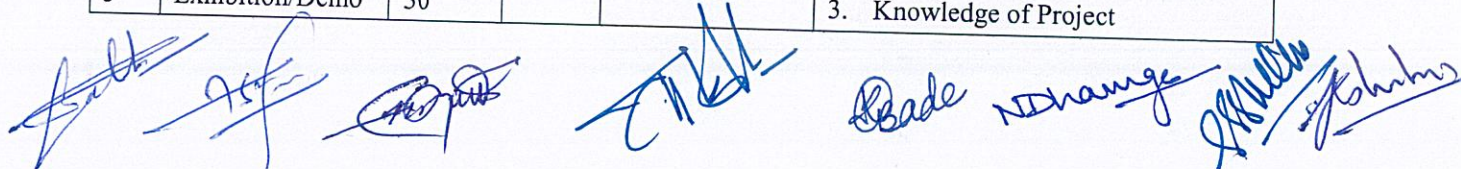| Sem: III	Total Hours Distribution per week		
Total Credit :2	Practical (P): 4 Hrs.		
Subject Code	BCE3P01	Community Project/Mini Project	
Examination Scheme – Practical			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
50 Marks	50 Marks	50 Marks	--

Course Outcomes

	After completion of syllabus, students would be able to
1	To identify the specific challenges and requirements of the community/technical problem related to civil engineering by using comprehensive needs assessment.
2	To involve active participation from community/construction industry members in the planning, decision-making, and implementation processes.
3	To develop capacity building, skill development, and the establishment of local resources by development of projects which focus on long-term solutions that can be sustained by the community/construction industry even after the project ends.
4	To make Successful community /technical development projects often require collaboration between the community, local organizations, NGOs, government agencies, Construction Industry and other stakeholders.
5	To ensure its effectiveness and make any necessary adjustments by using Monitoring and evaluating the project's progress and its impact on community/construction industry.

Following guidelines may be used for the Community/mini-project.

- Project allotment should be done at the end of 2nd semester.
- After allotment of guide, student have to identify the problem/issue from Community/Construction Industry by comprehensive assessment of problem/issue.
- Industry person/community person experience greater than 10 years may be Co guide.
- Minium Three students and maximum six students should be in a one group.
- Throughout the 3rd semester session, two Progress seminars are expected from each group namely; Introductory Project Seminar and Project Progress Seminar.
- Before last teaching day of session, Civil Engineering Department have to conduct Exhibition/Demonstration for all groups.
- Internal Assessment as per Below table
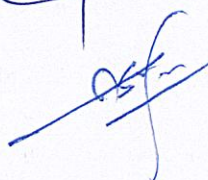
Sr. No.	Activity	Max Marks	Total marks	Expected	Assessment
1	Introduction seminar	10	50	Title finalization	Problem & its comprehensive study, problem identification method.
2	Project Progress Seminar	10		Progress of project	1. Procedure/methedology adopted 2. Presentation skill 3. Knowledge of Project
3	Exhibition/Demo	30			

nstration				4. Involvement in Project
				5. Team work

- After completion of project all students groups must submit the project report in spiral binding as per the prescribed format.
- If any group has to present/ publish paper related to their project at National or International.(It is an optional) But at the time of external examination, Examiner can give marks on their published work.
- After completion of project all students groups must submit the project report in spiral binding as per the standard format.
- If any Change of Guide then department have to produce justified reasons to external examiner.
- External Examination will be in terms of presentation/viva voce.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
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B.TECH. CIVIL ENGINEERING

Sem: III		Total Hours Distribution per week	
Total Credit: 3	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): 0 Hr.	
Subject Code	BOE3T01	Open Elective – I Building Construction Materials and Practices	
Examination Scheme			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

	Course Objectives
1	To prepare the students to understand components of buildings and their functions.
2	To learn about various building materials and their execution.
3	To study the necessity and behavior of foundations in construction.
4	To explore innovative solutions for sustainable and eco-friendly construction.
5	To understand the composition, properties, and mix design techniques of concrete, enabling the selection and optimization of materials.

	Course Outcomes
	After completion of syllabus, students would be able to
1	Identify and describe the components of a building.
2	Differentiate and classify various building materials.
3	Select suitable materials for construction projects.
4	Analyze different types of foundations and structural systems.
5	Apply knowledge of concrete ingredients, properties, and mix design techniques to optimize workability, strength, and durability.

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
UNIT 1			
Stones- Types of Stones, Requirements of Good Building Stones, Dressing of stones, Deterioration and Preservation of Stone Work.	2		
Bricks - Classifications, Manufacturing of Clay Bricks, Requirements of Good Bricks.	2		1

Alternative bricks (fly ash bricks, AAC blocks)	1		
Lime- Classification, Properties.	1		
UNIT 2			
Doors, Windows and Ventilation- Location of Doors and Windows, Technical Terms, Material for Door and Windows	2		2
Fire-resistant doors and windows Prefabricated and modular construction techniques Advanced scaffolding systems and safety measures	2		
Form Work- Introduction to Formwork, Scaffolding	2		
UNIT 3			
Foundation-Introduction, Necessity of Foundation, Causes of failure of Foundations and Remedial Measures.	2		3
Soil stabilization techniques &Underpinning methods for foundation repair	2		
Types of Structure- Load Bearing Structures and Framed Structures.	2		
UNIT 4			
Wall Finishes, Plastering, Paintings, Purposes, Methods, Defects and their Solution, Glass- Types and Uses	3		4
Green building materials and finishes& Smart coatings and self-healing materials	3		
UNIT 5			
Ingredients of concrete – Cement, Aggregates, Water, and Admixtures.	3		5
Workability, strength, and durability properties of concrete. Mix design techniques – nominal mix and design mix.	3		

Reference Books:
1. Building Construction by Rangwala.
2. Building Construction & Construction Materials by G. S. Birde& T. D. Ahuja.
3. Building Construction by Arun Kr. Jain Ashok Kr. Jain & B. C. Punmia.
4. Building Construction by Gurucharan Singh.

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FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. CIVIL ENGINEERING

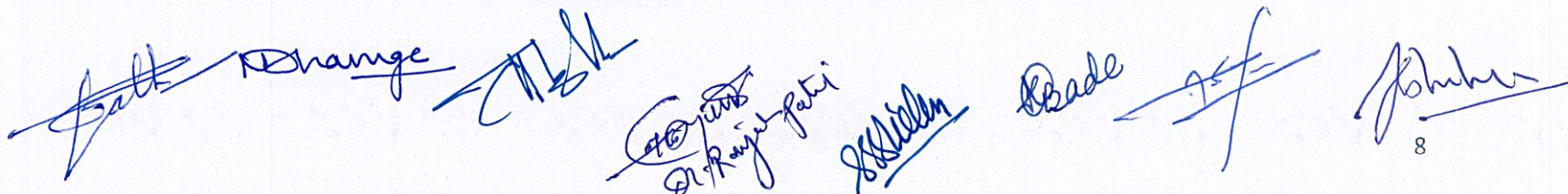| Sem: III	Total Hours Distribution per week	
Total Credit : 1	Practical (P): 2 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BOE3P01	Open Elective – I Building Construction Materials and Practices Lab
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
25 Marks	25 Marks	25 Marks	--

List of Experiments: Any 08

1. Identification of Stones & Bricks – Study of different types of stones and bricks used in construction.
2. Brick Testing – Conducting tests such as water absorption, compressive strength, and efflorescence.
3. Lime and Cement Tests – Identification of lime and its properties; consistency and setting time tests of cement.
4. Analysis of Doors and Windows – Study of different types of doors and windows used in modern construction.
5. Formwork and Scaffolding – Demonstration of various formwork and scaffolding systems.
6. Soil Bearing Capacity Test – Field determination of soil bearing capacity for foundation design.
7. Plastering & Painting Techniques – Demonstration of different plastering and painting methods, including defect analysis.
8. Glass Identification & Applications – Study of different types of glass and their uses in construction.
9. Green Building Practices – Case study on sustainable and eco-friendly construction materials.
10. Study of Earthquake tips– Understanding the design principles of earthquake-resistant buildings.

B. Tech. Sem-IV (Civil Engineering-Major)

SN	Course Category	Course Code	Name of Course	BoS	Teaching Scheme (hrs.)			Total Credit	Examination Scheme							
									Theory				Practical			
					(Th)	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.	
1	PCC-IV	BCV4T12	Structural Analysis	Civil	3	-	-	3	3	70	30	45	-	-	-	
2	PCC-IV	BCV4P12	Structural Analysis Lab	Civil	-	-	2	1	-	-	-	-	-	50	25	
3	PCC-V	BCV4T13	Geotechnical Engineering	Civil	3	-	-	3	3	70	30	45	-	-	-	
4	PCC-V	BCV4P13	Geotechnical Engineering Lab	Civil	-	-	2	1	-	-	-	-	25	25	25	
5	MDM-II	BMD4T14	Artificial Neural Networks	Civil	2	-	-	2	3	70	30	45	-	-	-	
6	OE-II	BOE4T02	Open Elective – II Refer OE Basket		2	-	-	2	3	70	30	45	-	-	-	
7	AEC-II	BAE4T02	Civil Engineering Report Writing	Civil	2	-	-	2	3	70	30	45	-	-	-	
8	HSSM-II	BHM4T02	Construction Planning And Management	Civil	2	-	-	2	3	70	30	45	-	-	-	
9	VEC-II	BVE4T02	Environmental Science	Civil	2	-	-	2	3	70	30	45	-	-	-	
10	VSC-II	BVS4P02	Building Design and Drawing Lab	Civil	-	-	4	2	-	-	-	-	50	50	50	
			Total		16	-	08	20		490	210		75	125		

Exit option: Award of UG Diploma in Major and Minor with 80 Credits and an additional 8 credits in skill-based courses, internship, mini projects etc.

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FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. CIVIL ENGINEERING

Sem: IV	Total Hours Distribution per week	
Total Credit : 3	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BCV4T12	Structural Analysis
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

Course Objectives

1	To study basic concepts of analysis of structural components.
2	To undestand structural response.
3	To study various methods of the analysis for determinate and indeterminate structure.

Course Outcomes

	After completion of syllabus, students would be able to
1	Analyse the continuous beam with and without sinking of support, by Three Moment Theorem.
2	Apply the Moment Distribution Method / Slope and deflection method to analyze indeterminate structures.
3	Draw influence line diagrams for different structures to analyze structural behavior.
4	Apply the Stiffness Matrix Method to analyze complex structures.
5	Analysis the columns and Arches.

SYLLABUS

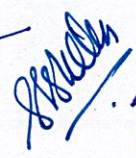| Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Unit 1: Statically Indeterminate Structures			
Introduction to Statically indeterminate Structures, Concept of Static indeterminacy. Analysis of Fixed and Continuous beams by Three moment theorem, effects of sinking of support.	7		1
UNIT II: ANALYSIS OF BEAMS AND FRAMES			
Analysis of Continuous Beams and Portal frames by Slope Deflection Method. Analysis of Continuous Beams and Simple Portal frames (Sway and Non Sway) Using Moment Distribution Method.	7		2
UNIT III: INFLUENCE LINE DIAGRAM			
Rolling loads on simply supported beams with concentrated and uniformly	7		3

distributed loads, maximum B.M. and S.F. Influence Line Diagrams for Reactions, Shear Forces and Bending Moments in simply supported beam, cantilevers and beams with overhangs, ILD for forces in members of Simple Truss.			
UNIT IV: MATRIX STIFFNESS METHOD - APPLICATION TO BEAMS AND PLANE FRAMES			
Basic concept, degree of freedom, direct stiffness Method. Formulation of elemental/local stiffness matrix and global stiffness matrix for beam members (without axial deformation), for plane frame members. Member load matrix due to concentrated loads, uniformly distributed loads. Transformation matrix, Assembly of global/structural load matrix up-to three elements. Solution to problems with maximum degree of freedom three.	6		4
UNIT V: COLUMN AND TWO-HINGED ARCHES			
Columns : Bucking of columns, Euler's and Rankine's formula, Two-Hinged Arches: Secant Formula Analysis of Two-Hinged Arches S.F. and normal thrust, parabolic arches.	6		4

List of Books:

- Structural Analysis –I, Fourth Edition, S. S. Bhavikatti, Vikas Publishing house Pvt. Ltd.
- Structural Analysis –II, Fourth Edition, S. S. Bhavikatti, Vikas Publishing house Pvt. Ltd.
- Basic Structural Analysis, Second Edition, C. S. Reddy, Mc Graw-Hill India.
- Basic Structural Analysis, Third Edition, C. S. Reddy, Mc Graw-Hill India.
- Structural Analysis - A Matrix method, Second Edition, G. S. Pandit & S. P. Gupta, Mc Graw-Hill.
- Advanced Structural Analysis, Devdas Menon, Narosa Publishing House, New Delhi.
- Structural Analysis, R. C. Hibbeler, Sixth Edition, Pearson.
- Theory of Structure, R.S. Khurmi & N. Khurmi, S-Chand Publication.

Reference Book:

- Theory of Structure, S. Ramamurtham, R. Narayanan, Eleventh Edition, Dhanpat Rai Publishing Company.
- Theory and Analysis of Structures, Volume – 1, O.P. Jain & B.K. Jain, Third Edition, Nem Chand Brothers.
- Theory of Structures, Timoshenko S. P. & Young D.H., International Edition, McGraw-Hill.
- Intermediate Structural Analysis, C. K. Wang, Indian Edition, McGraw-Hill.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. CIVIL ENGINEERING

Sem: IV	Total Hours Distribution per week	
Total Credit :1	Practical (P): 2 Hrs.	
Subject Code	BCV4P12	Structural Analysis Lab
Examination Scheme – Practical			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
50 Marks	25 Marks	25 Marks	--

List of Experiments:
a) The practicals are based on theory subject of Structural Analysis and CO's.
b) Minimum eight practicals shall be performed from list of experiments.
c) Any one practical may be performed using virtual lab.

Exp. No.	List of Experiments
1	Verification of Maxwell's reciprocal theorem using simply supported beam.
2	Verification of Maxwell's reciprocal theorem using simply supported truss.
3	Horizontal thrust in two hinged arch.
4	ILD for Horizontal thrust in two hinged arch.
5	Verification of flexural rigidity using simply supported beam.
6	Analysis of a continuous beam using computer software.
7	Analysis of a plane frame using computer software.
8	Study practical on strain gauge.
9	Comparison of different types of column buckling load.
10	Horizontal thrust in portal frame.
11	Introduction of different method of structural analysis.
12	To determine the deflection of two Span Continuous beam.

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B.TECH. CIVIL ENGINEERING

Sem: IV	Total Hours Distribution per week	
Total Credit : 3	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BCV4T13	Geotechnical Engineering
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

Course Objectives

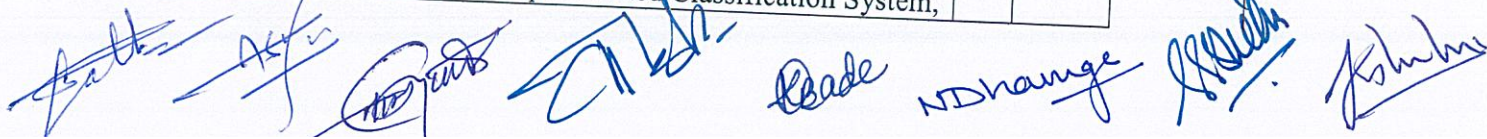| 1	Imparting knowledge about index properties and their determination.
2	Analyzing significance of permeability and seepage in soil.
3	Understanding the concept of consolidation and its significance in soil mechanics.
4	Evaluating the role of compaction in improving soil stability and load-bearing capacity.
5	Estimate the compressibility potential and analyze shear strength parameters.

Course Outcomes

After completion of syllabus, students would be able to

1	Determine basic properties and index properties of soil using knowledge of engineering mechanics and hydraulics.
2	Construct and analyze principles of permeability and seepage in soil mechanics.
3	Explain the fundamental principles of soil consolidation and its significance in geotechnical engineering.
4	Evaluate hydraulic properties and compaction of soil, identify the soil classification,
5	Explain the significance of shear strength in soil stability and geotechnical engineering applications.

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Unit 1: Introduction, Physical & Index properties of soil:			
Introduction: Origin sand formation of soil, Various soil weight & volume inter-relationship. Physical & Index properties of soil: Weight- Volume Relationships, Insitu Density, Moisture Content, Specific Gravity, Relative Density, Atterberg's Limits, Soil Indices, consistency of soil, Particle Size Distribution of soil: Sieving, Sedimentation Analysis, Identification & Classification of soil: Field identification of soil, Soil Classification: as per Unified Classification System,	9		1

IS Code Recommendation, AASHTO Classification			
Unit 2: Permeability and Seepage			
Flow through soil: Darcy's Law, Coefficient of permeability, laboratory and field determination of coefficient of permeability, Permeability for Stratified Deposits, Laplace's Equations, Flow nets, Flow Through Earthen Dam, Estimation of Seepage, Uplift due to seepage. Effective Stress Principles: Effective Stress, Effective pressure due to different conditions, Seepage force, Critical hydraulic gradient, Quick sand condition.	7		2
Unit 3: Consolidation			
Consolidation of soil: Introduction, types of clay deposits, initial, primary & secondary consolidation, spring analogy for primary consolidation, one dimensional consolidation test results, Terzaghi's theory of consolidation.	5		3
Unit 4: Compaction			
Compaction: Mechanism of compaction, factors affecting compaction. Standard & modified proctor Tests, field compaction equipments, quality control.	5		4
Unit 5: Shear Strength			
Shear Strength of Soil: Basic concepts, Mohr- Columb's Theory, Laboratory Determination of soil shear parameter- Direct Shear, Tri-axial Test, Unconfined Compression, Vane Shear Test, Sensitivity & thixotropy of clay.	7		5

Text/Reference Books:

1. Soil Mechanics & Foundation Engg, B.C.Punmia, Laxmi Publication.
2. Text book of Soil Mechanics & Foundation Engineering, V.N.S. Murthy, CBS Publisher's & Distributors.
3. Geotechnical Engineering – Principles and Practice, Coduto, Pearson Education.
4. Soil Mechanics, Lambe & Whitman, WIE.
5. Basic & Applied Soil Mechanics, Gopal Ranjan & A.S.R.Rao, Willes Eastern Ltd.
6. Soil Mechanics & Foundation Engg, K.R. Arora, Std. Publisher.
7. Soil Mechanics & Foundation Engg, Modi, Std. Publisher.

Online Learning Platform
4. **Swayam**: Geotechnical Engineering I
https://swayamprabha.gov.in/index.php/program_data/data/12
5. **Class central**: Soil Mechanics
https://www.classcentral.com/subject/geotechnical-engineering
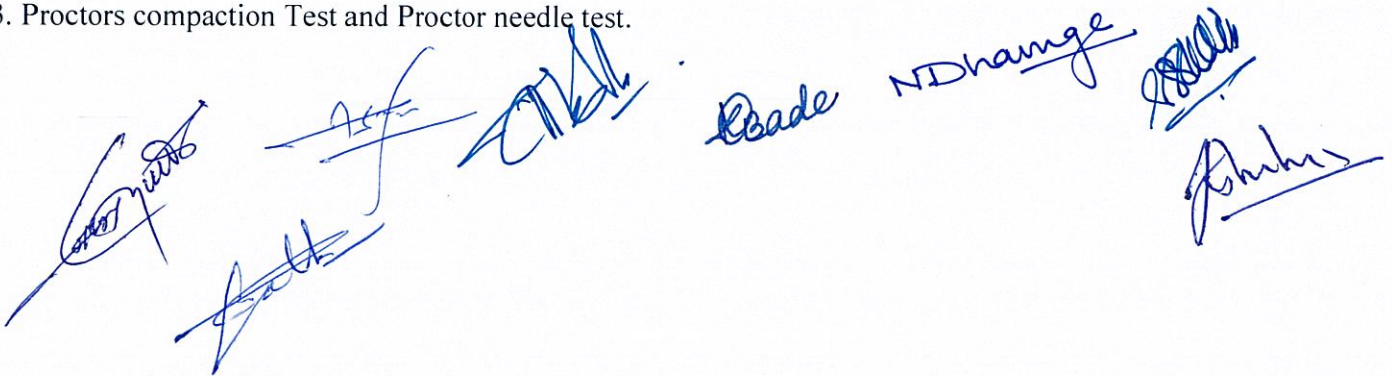
RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. CIVIL ENGINEERING

Sem: IV	Total Hours Distribution per week	
Total Credit : 1	Practical (P): 2 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BCV4P13	Geotechnical Engineering
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
25 Marks	25 Marks	25 Marks	--

List of Experiments : Any 8

1. Moisture content and Specific gravity of soil.
2. Grain size Analysis – (Sieve Analysis).
3. Consistency limit, plastic limit and liquid limit of soil.
4. Hydrometer Analysis.
5. Constant Head Permeability test of or Falling Head Permeability test.
6. Consistency limit of soil (shrinkage limit).
7. Field Density by sand replacement method.
8. Field Density by core cutter method.
9. Unconfined compression test.
10. Direct shear Test.
11. Triaxial shear test (Demonstration).
12. Study of Plate load Test.
13. Proctors compaction Test and Proctor needle test.

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B.TECH. CIVIL ENGINEERING

Sem: IV	Total Hours Distribution per week	
Total Credit : 2	Lecture (L): 2 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BMD4T14	Artificial Neural Networks
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

Course Objectives	
1	To learn intelligence systems and knowledge based systems and networks

Course Outcomes	
After completion of syllabus, students would be able to	
1	Understand and practice python environment and basics of python
2	Write modular programs using functions and modules
3	Use feed back and feed forward
4	Learn to develop civil engineering applications using ANN, associate=ive memory and self organizing maps.

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Unit 1: Introduction to Artificial Neural Networks			
Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between them and the Computer, Comparison Between Artificial and Biological Neural Network Basic Building Blocks of Artificial Neural Networks, Artificial Neural Network (ANN) terminologies.	6		1
Unit 2: Fundamental Models of Artificial Neural Networks			
Introduction, McCulloch – Pitts Neuron Model, Learning Rules, Hebbian Learning Rule Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or Least Mean Square (LMS) Rule,Competitive Learning Rule, Out Star Learning, Boltzmann Based Learning, Hebb Net. Perceptron Networks: Introduction, Single Layer Perceptron, Brief Introduction to Multilayer Perceptron Networks.	6		2
Unit 3: Networks			
Feedback Networks: Introduction, Discrete Hopfiled Net, Continuous	6		3

Hopfiled Net, Relation between BAM and Hopfiled Nets. **Feed Forward Networks**: Introduction, Back Propagation Network (BPN), Radial Basis Function Network (RBFN).			
Unit 4: Associative Memory Networks			
Introduction, Algorithms for Pattern Association, Hetero Associative Memory Neural Networks, Auto Associative Memory Network, Bi- directional Associative Memory. Self Organizing Feature Map: Introduction, Methods Used for Determining the Winner, Kohonen Self Organizing Feature Maps	6		4

Text/Reference Books:

1. Simon Haykin, "Neural networks A comprehensive foundations", 2nd ed., Pearson Education, 2004.
2. B Yegnanarayana, "Artificial neural networks", 1st ed., Prentice Hall of India P Ltd, 2005.
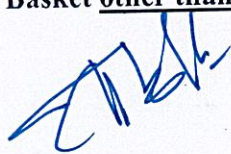3. Li Min Fu, "Neural networks in Computer intelligence", 1st ed., TMH, 2003.
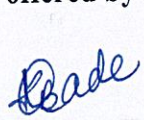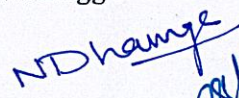
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FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. CIVIL ENGINEERING

Sem: IV	Total Hours Distribution per week	
Total Credit : 2	Lecture (L): 2 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BOE4T02	Open Elective - II
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

NOTE: For BOE4T02, refer OE Basket **other than** OE offered by Civil Engg Board

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B.TECH. CIVIL ENGINEERING

Sem: IV	Total Hours Distribution per week	
Total Credit : 2	Lecture (L): 2 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BHM4T02	Construction Planning and Management
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

	Course Objectives
1	To provide engineering students with a foundational understanding of Construction Planning and Management

	Course Outcomes
	After completion of syllabus, students would be able to
1	To understand the role of stakeholders in construction management & economy
2	To understand the job layout labour wages ,accidents & safety measure in construction
3	To understand the methods of network techniques such as Critical Pathe Method (CPM), Cost optimization in CPM and to updating for construction and management.
4	To understand Resources planning, allocation and scheduling and Programme Evaluation And Review Technique (PERT)

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Unit 1			
CONSTRUCTION MANAGEMENT AND ECONOMY Need for construction management, Scope of construction management. Aspect of construction management, PHASES of project or construction management, Engineer and construction economy Contractor and construction economy, Construction cost, Cost control records, Cost index or price index, Construction cost control, Planning the project, Financing the project, Project Management Triangle, Project management activities, Stages in construction, Work breakdown structure. **MANAGERIAL ORGANIZATION** Levels of management, Functions of management, Qualities of a good entrepreneur, Construction project Manager, Characteristics of a good	6		1

manager, Qualifications of an administrator, Conditions essential for carrying on business, Meaning of organization, Forms of business organization, Principles of organization, Systems of staff organization, Organization of a construction company, Office management, Personnel management, Office discipline.			

Unit 2			
JOB LAYOUT AND PROJECT SUPERVISION Job layout, General principles for Job layout, Factors governing Job layout, Advantages of Job layout, Preparation of Job layout, Project supervision, Project control, Project evaluation, Construction camp **CONSTRUCTION ACCIDENTS AND SAFETY MEASURES** Importance of Safety in Construction Projects, Causes of construction accidents, Classification of construction accidents, Injury-frequency rate, Injury-severity rate, Injury-index, Equivalent time charge, Compensation insurance, Accident cost, Safety programme in construction projects, Rules for preventing construction accidents, Safety Precautions for Different Items of Construction, Safety Precautions For Foundation and Excavation, Safety Precautions For Brickwork, Concrete Work, Concrete Work in Cold Weather, Concrete Work in Hot Weather, Form Work, Scaffolding , Shoring , Underpinning, Steel Structures, Construction of Multi-Storeyed Buildings, hot Bituminous Work, Demolition work,. Storage of Materials, Tunnel Construction. **CONSTRUCTION LABOUR** Immobility of labour, Theories of wages, Nominal wages and real wages, Psychic income, Systems of wage payments, Incentive plans, Group incentive plans, Payment by result, Profit-sharing, Morale Measurement of moral, Trade unions, Labour welfare, Indian labour	6		2

Unit 3			
CONVENTIONAL METHODS OF MANAGEMENT TECHNIQUES Gantt or Bar charts, Mile-Stone Charts, Line of Balance (Lob) Technique **INTRODUCTION TO NETWORK TECHNIQUES** Features of network planning, Elements of Network Diagram, Rules for Preparing Network Diagram Rules for network diagram, Fulkerson's Rule for Numbering the Events, Types of Network Diagram, Arrow diagram or Activity-On-Arrow (AOA) diagram, Circle diagram or Activity-On-Node (AON) diagram, Typical problems on network diagram. **NETWORK TECHNIQUES: CRITICAL PATH METHOD (CPM)** Introduction of CPM, Uses of CPM, Advantages of CPM, Application of CPM in project management for determining extension of time, Difficulties in implementation of the CPM, Activity Duration Time (t), Earliest occurrence time (TE) for event, Latest occurrence time (TL) for event, Start and Finish Times for activity. **FLOATS:** Significance of floats, Critical path and scheduling, typical problems on critical path method (CPM) **COST OPTIMIZATION IN CRITICAL PATH METHOD (CPM)**	6		3

Utility data with respect to time and cost, Project cost, Cost-time optimization Cost slope, Cost Optimization by crashing, Time-grid diagram, Typical problems on cost optimization. **UPDATING NETWORK DIAGRAM FOR CPM CONSTRUCTION PLANNING AND MANAGEMENT DETAILED CONTENTS** Necessity of Updating, Steps for Updating, Typical Problems on Updating Network Diagram for CPM			
Unit 4			
RESOURCES PLANNING, ALLOCATION AND SCHEDULING Resources planning, Resources allocation, Resource scheduling, typical problems on resources planning, allocation and scheduling **PROGRAMME EVALUATION AND REVIEW TECHNIQUE (PERT)** Programme Evaluation and Review Technique (PERT), Terminology Used in PERT, Percentage of probability, Implementing PERT, PERT network scheduling, Slacks of events, Negative slack and negative float, Typical problems on PERT, Selection of technique	6		4

Text/Reference Books:

1. Construction Planning and Management by K.S. Rangwala Charotar Publishing

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. CIVIL ENGINEERING

Sem: IV	Total Hours Distribution per week	
Total Credit: 2	Lecture (L): 2 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BVE4T02	Environmental Science
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

Course Objectives

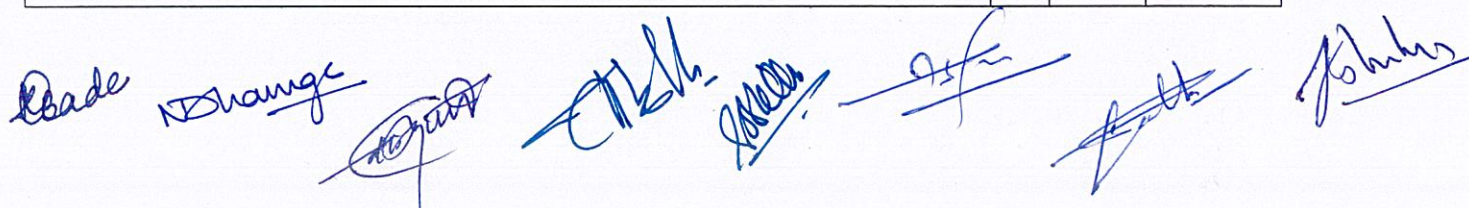|	
1	To understand the fundamentals of environmental science and its relevance in civil engineering.
2	To introduce concepts of sustainable development
3	To study water resource management.
4	To create awareness of environmental laws and policies.

Course Outcomes

After completion of syllabus, students would be able to

1	Understand the fundamentals of environmental science
2	Apply sustainable development principles in civil engineering
3	Demonstrate knowledge of water resource management
4	Interpret environmental laws and policies

SYLLABUS

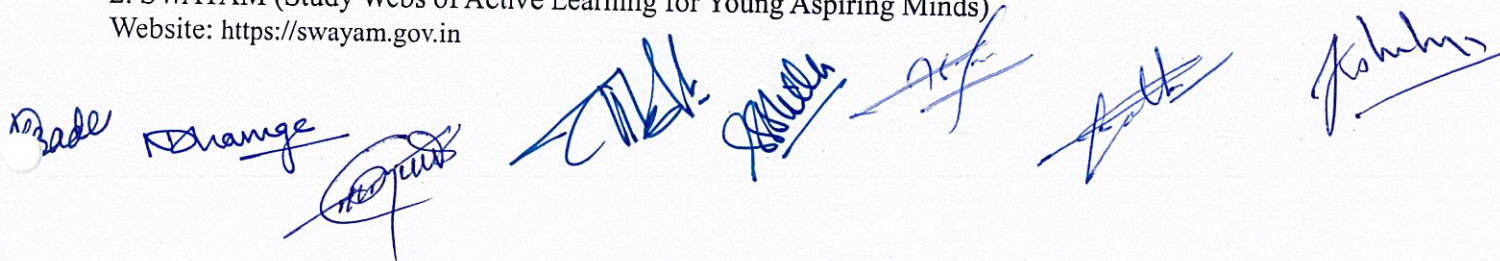| Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Unit I: Introduction to Environmental Science	6	-	1
• Definition, Scope, and Importance • Components of Environment: Atmosphere, Hydrosphere, Lithosphere, and Biosphere • Role of Civil Engineers in Environmental Protection • Man-Environment Relationship and Need for Sustainability			
Unit II: Sustainable Development	6	-	2

• Concept of Sustainable Development in Civil Engineering • Green Building Concepts, LEED Certification • Solid and Hazardous Waste Management: Collection, Treatment, and Disposal • Environmental Impact Assessment (EIA): Methods and Case Studies • Life Cycle Assessment (LCA) in Civil Engineering			
Unit III: Water Resource Management	6	-	3
• Sources of Water: Surface and Groundwater • Rainwater Harvesting and Watershed Management • Wastewater Treatment Technologies: Primary, Secondary & Tertiary Treatment			
Unit IV: Environmental Policies, Laws & Regulations	6	-	4
• Environmental Protection Act, 1986 • Water (Prevention and Control of Pollution) Act, 1974 • Air (Prevention and Control of Pollution) Act, 1981 • Role of Pollution Control Boards • International Agreements: Kyoto Protocol, Paris Agreement			

Text/Reference Books:

1. "Environmental Science and Engineering" – Suresh K. Dhameja
2. "Environmental Engineering" – Peavy, Rowe, and Tchobanoglous
3. "Environmental Studies" – R. Rajagopalan
4. "Waste Management and Environmental Sustainability" – S. Ramachandra Rao
5. "Introduction to Environmental Engineering" – Mackenzie L. Davis and David A. Cornwell

Online Learning Platform:
1. NPTEL (National Programme on Technology Enhanced Learning)
Website: https://nptel.ac.in
2. SWAYAM (Study Webs of Active Learning for Young Aspiring Minds)
Website: https://swayam.gov.in

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY
B. Tech. CIVIL ENGINEERING

Sem: IV	Total Hours Distribution per week		
Total Credit: 2	Practical (P): 4 Hrs.		
Course Code	BVS4P02	Building Design and Drawing Lab	
Examination Scheme- Practical			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
50 Marks	50 Marks	50 Marks	--

Practical Course Objectives

1	To impart basic knowledge and skills of drafting software AUTOCAD (2D)
2	To impart knowledge of basic principles of building planning.

Practical Course Outcomes

After completion of the practical course, students would be able to

1	Sketch various components of a building using basic commands of AutoCAD.
2	Paraphrase basic principles of planning of a building.
3	Draft submission drawings of single-storied and multi-storied buildings using AutoCAD.

List of Practical

Pr. No.	List of Practical	Mapped with CO
1	Introduction to AutoCAD (2D) drafting software and its basic commands.	CO1
2	Exercise on Draw, Modify, Annotation and Layer tool bars.	CO1
3	Drafting of Brick masonry bonds and section through wall using AutoCAD.	CO1
4	Drawing of building components like stair, staircase, doors, and Windows using AutoCAD.	CO1
5	Study of Principles of Building Planning and Building bye Laws (UDCPR).	CO2
6	Planning of a single storied residential building with R.C.C. flat roof and drawing of its submission drawing using AutoCAD.	CO2 & CO3
7	Planning of a multi storied residential building with R.C.C. flat roof and drawing of its submission drawing using AutoCAD.	CO2 & CO3
8	Drawing of double line plan, front elevation and section of a multistorey Public Building using AutoCAD.	CO3

Text/ Reference Books:
1. Vishnu Priya Singh, "AutoCAD 2019 – Simplest Book for Learning for Engineers and

Designers" ISBN: 978-81-931622-8-6.

2. M. G. Shah, C. M. Kale, S. Y. Patki (2012), "Building Drawing with an Integrated Approach to Built Environment", Tata McGraw-Hill Education.
3. M. Chakraborti (2017), "Civil Engineering Drawing (including Architectural aspect)", Monojit Chakraborti Publications, Kolkata **Online Learning Platform.**
4. National Building Code (NBC 2016)
5. Unified Development Control and Promotion Regulations for Maharashtra State (UDCPR January 30, 2025)

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY
B.TECH. CIVIL ENGINEERING

Sem: IV	Total Hours Distribution per week	
Total Credit : 2	Lecture (L): 2 Hrs	Tutorial/Activity (T/A): 0 Hr.
Subject Code	BOE4T02	Open Elective – II (Environmental Management)
Examination Scheme		
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks	70 Marks	45 Marks	3 Hours

Course Objectives	
1	To equip individuals with the knowledge of Environmental pollution and its control
2	To understand the fundamentals of Climate change
3	To promote sustainable practices.
4	To create awareness of environmental Conservation

Course Outcomes	
After completion of syllabus, students would be able to	
1	Understand environmental pollution and its control measures.
2	Acquire knowledge of various environmental challenges
3	Understand the concept of sustainable development
4	Know the role of individuals in environmental protection

Syllabus

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Unit I: Introduction to Environmental Pollution and Control	6	-	1
Introduction to Pollution: Air, Water, Land, and Noise – Causes, Effects, and Control Measures Plastic Pollution: Causes, Effects, and Control Measures Municipal Solid Waste: Definition, Composition, Effects and Control Measures Electronic Waste: Definition, Composition, Effects and Control Measures			
Unit II: Climate Change and Environmental Challenges	6	-	2

Global Warming and the Greenhouse Effect – Causes, Consequences, and Mitigation Strategies Ozone Layer Depletion – Causes, Impacts on the Environment and Human Health, and Protective Measures Acid Rain – Formation, Effects on Ecosystems and Infrastructure, and Control Measures Nuclear Hazards – Sources, Environmental and Health Risks, and Safety Regulations			
Unit III: Environmental Sustainability	6	-	3
Overview of Environmental Management and Sustainable Development Significance of Sustainable Development – Need, Benefits, and Long-Term Impact Sustainable Development Goals– Objectives and Global Implications Sustainability Practices – The Three "R" Concept of Waste Management, Water Conservation, and Energy Conservation Carbon Credits: An overview, Purpose, Types and benefits			
Unit IV: Environmental Conservation	6	-	4
Environmental Values and the Impact of Technological Developments on Society and the Environment – Positive and Adverse Effects Contributions to Environmental Conservation – Role of Individuals, Corporations, and Society Case Studies: • Industrial and Chemical Disasters: Bhopal Gas Tragedy • Air and Water Pollution: New Delhi's Air Pollution, Ganga River Pollution • Natural Disasters and Climate Events: Uttarakhand Flash Floods			

Text/Reference Books:

1. "Environmental Management" – N.K. Uberoi
2. "Environmental Science and Engineering" – Suresh K. Dhameja
3. "Environmental Management: Principles and Practice" – John Pallister
4. "Introduction to Environmental Management" – Mary K. Theodore and Louis Theodore
5. "Environmental Management for Sustainable Development" – Chris Barrow
6. "Environmental Impact Assessment" – Larry W. Canter
7. "Environmental Management" – Bala Krishnamoorthy
8. "Industrial Pollution Control and Environmental Management" – A.K. Srivastava
9. "Waste Management Practices: Municipal, Hazardous, and Industrial" – John Pichtel
10. "Environmental Laws and Policies in India" – Kailash Thakur
11. "Climate change and Its Control" – Dr. R.N.Patil, Dr. R. M. Dhoble, Dr. A. Bhambhulkar

Online Learning Platform:
   1. NPTEL (National Programme on Technology Enhanced Learning)
   Website: https://nptel.ac.in   Environmental Impact Assessment, Environmental Management, Sustainable Development
   2. SWAYAM (Study Webs of Active Learning for Young Aspiring Minds)
   Website: https://swayam.gov.in
   3. Climate Literacy and Energy Awareness Network (CLEAN)
   Website: https://cleanet.org