RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FACULTY OF SCIENCE & TECHNOLOGY

B. TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem: VI	**Total Hours Distribution per week**		
Total Credit:03	**Lecture (L): 03 Hrs**	**Tutorial/Activity (T/A): 0 Hrs.**	**Practical (P): Nil Hrs.**
Subject Code	**BECVE605T**	**Name of Subject: Environmental Engineering (Open Elective-I)**	

Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks **(15 Marks for sessional examination)** **(15 Marks for Activity based)**	**70 Marks**	**45 Marks**	**3 Hours**

Course Objective	
1	Understanding the concept and principles of environment.
2	To impart knowledge on the sources, effects and control techniques of water pollution.
3	To understand the behaviour of air pollutants and the strategies to control their presence in the ambient atmosphere.
4	To provide a comprehensive insights of the types, sources, generation, storage, collection, transport, processing and disposal of solid waste.

Course Outcome	
After completion of syllabus student able to	
1	Explore the components of biosphere and impact of human activity on environment.
2	Summarize the causes and sources of pollutants, and their impact on global environment.
3	Develop ethics and scientific awareness about waste generation and treatment.
4	Identify sources and types of wastes and its management.
5	Understand noise, noise pollution and control.

MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	1	1	1	1	2	3	1	3	1	1	1
CO 2	3	2	1	2	1	1	3	1	3	1	2	2
CO 3	2	2	1	1	1	2	2	1	2	1	1	1
CO 4	2	2	1	2	1	1	2	1	2	1	1	1
CO 5	2	1	1	2	1	1	2	1	2	1	1	1

1 Low 2 Medium 3 High

SYLLABUS

Unit No.1 Introduction to Environment			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Definition, scope and importance of environmental studies. Ecosystem, types, structure and function of ecosystem.	**01**		**1**
Energy flow in ecosystem. Biodiversity and its importance, threats to biodiversity and conservation of biodiversity. Natural resources and associated problems.	**02**		**1**
Renewable and non-renewable resources, forest resources- Description, benefits, Effects due to deforestation, Water resources –Use and conservation. Mineral resources–mining activity.	**02**		**1**
Role and responsibility of engineer in environmental protection, health and safety. Fire hazards, prevention and precautions. Industrial hazards prevention and protection.	**01**		**1**
Protection from air and noise pollution. Environment protection act Wild life protection act. Forest conservation act.	**01**		**1**
Population growth aspects and importance and effects on environment. Human health and Human rights. Concept of carbon credits.	**01**		**1**
	08		
Unit No.2 Water Pollution & Waste Water Treatment Method			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Water resources, Classification of water, Origin, composition and characteristics of domestic waste water as well as industrial waste water, Biochemical oxygen demand, Water pollution laws and standards.	**02**		**2**
Water conservation, watershed management, Rain water harvesting: Definition, methods and benefits.	**02**		**2**
Water (prevention and control of pollution) act, Waste water, Classification of waste water, Chemical oxygen demand. Basic processes of water treatment.	**01**		**2**

Meaning of primary, secondary and tertiary treatment.	**01**		**2**
Flow chart of a simple effluent treatment plant, Theory of industrial waste treatment, Volume reduction, neutralization and precipitation methods.	**01**		**2**
	07		
Unit No.3 Air Pollution			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Standard definition of air pollution, Composition of natural air, Names of air pollutants, Classification of air pollutants, primary and secondary pollutants.	**02**		**3**
Classification of source of air pollutants on different bases, Definition of different types of aerosols.	**01**		**3**
Effect of air pollution on: human health, material properties, vegetation. Major toxic metals and their effects. Air (prevention and control of pollution) act.	**01**		**3**
Major environmental phenomenon e.g., acid rain, global warming, greenhouse effect, ozone layer depletion.	**01**		**3**
Air quality standards, Brief description of air pollution laws. Meteorological parameters influencing air pollution Environmental lapse rate, temperature inversion.	**01**		**3**
Role of national green tribunal in India, Function of Regulatory boards like CPCB and State Pollution Control Boards	**01**		**3**
	07		
Unit No.4 Energy Environment Climate Change			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
An overview of Bureau of Energy Efficiency (bee), The National Action Plan on Climate Change (NAPCC),	**02**		**4**
Schemes under The National Mission for Enhanced Energy Efficiency (NMEEE),	**02**		**4**
Energy Conservation Building Code (ECBC),	**01**		**4**
Bio diversity and its conservation, Sustainable development, Kyoto Protocol,	**01**		**4**
Conference of Parties (Cop), Clean Development Mechanism (CDM).	**01**		**4**
	07		
Unit No.5 Solid Waste Management & Noise Pollution			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Sources and classification of solid waste, Public health aspects, Disposal methods – open dumping, sanitary, land fill, Incineration, compositing.	**02**		**5**
Potential methods of disposal, Recovery and recycling of paper, glass, metal and plastic Sources of noise pollution.	**02**		**5**

Units of Noise pollution measurement, Allowable limits for different areas.	**01**		**5**
Problems of noise pollution and measures to control it, Noise pollution control devices brief discussion	**02**		**5**
	07		

References							
Applicable for Unit No.	**Name of Book**	**Name of Author**	**Name of Publisher**	**Edition**	**Category**		
					Text Book	**Research paper**	**Reference Book**
1	Environmental Engineering	Peavy and Rowe	McGraw Hill India.	2013			
2	Noise Control: Principles and Practices	Bruel & Kjaer,	. B & K Pub., Denmark	2nd ed			
3	Wastewater Engineering: Treatment and Reuse		Metcalf and Eddy	4th ed			
4	Environmental pollution control Engineering	C.S. Rao					
5	Industrial waste and its treatment	Seth					

(Dr. A.N. Dabhade)
BoS Member

(Dr. Avinash N Shrikhande,)
BOS (Civil Engg) Chairman

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FACULTY OF SCIENCE & TECHNOLOGY
B.TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem: VII	**Total Hours Distribution per week**		
Total Credit: 03	**Lecture (L): 3Hrs**	**Tutorial/Activity (T/A): NA**	**Practical (P): 2 Hrs.**
Subject Code	**BTCVE 705T**	**Name of Subject: Civil Engineering Materials, Testing and Evaluation(Open Elective-II)**	

Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks (15marks for sessional Examination) (15 Marks for Activity based)	**70 Marks**	**45 Marks**	**3 Hours**

Course Objective	
1	The properties and importance of various constituent materials of concrete used in construction
2	The mechanical behaviour of engineering materials under compressive and tensile loads
3	The fundamentals of fracture mechanics and identify initiation and propagation of crack around stress-strain fields.
4	The standard testing procedures and assess engineering properties of construction materials.
5	The main goal of this course is to provide students with all information concerning principle, way of measurement, as well as practical application of mechanical characteristics.

Course Outcome	
After completion of syllabus student able to	
1.	Evaluate the role of materials in Civil Engineering
2.	Know the mechanical behaviour and properties of steel and concrete by standard testing procedures for identifying their performance
3.	Explain special materials, composite materials and use of new techniques in constructions for satisfying the future needs of industry.
4.	Exposure to a variety of established material testing procedures/techniques and the relevant codes of practice
5.	Evaluate and write a technical laboratory report.

MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Subject Code &CO NO.												
1	2	3			2		2					3
2	2			2	2	1	2		1			2
3	2			2	2	2	3					3
4	2	3		2	2							3
5	2			3						1	2	3

1 Low 2 Medium 3 High

SYLLABUS

Unit No.1 Introduction To Civil Engineering Materials			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Introduction and uses of cement, sand, aggregates	**01**		**1**
concrete, mortar and grouts, masonry mortars, rendering, cementations grouts	**02**		**1**
RCC, clay bricks, calcium silicate bricks, concrete blocks., rubbles, steel, mechanical properties of steel, different applications	**02**		**1**
Floor and roofing tiles, slates, timber, strength of timber, engineered wood products metals, glass for glazing, glass fibres, glass wool	**02**		**1**
Water proofing agents: any five water proofing agents, difference between wetting agents and water proof agent	**01**		**1**
	08		
Unit No.2 Basic Properties of Materials			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Importance of materials in civil engineering construction, types of materials such as ceramics, concrete, composites, optical /electronics materials, glass, metals, nano-materials, polymers and plastics, wood and other materials, comparison of strengths of various materials.	**04**		**2**
Some basic properties of materials such as temperature, energy,	**03**		**2**

specific heat, thermal conductivity, coefficient of thermal expansion, comparison for environmental impact, health and safety.			
	07		

Unit No.3 Special Materials

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Composite Materials: RCC, FRC, AAC (Autoclaved aerated concrete) blocks, WPC (Wood-plastic composites) Material, Cera sheets, 3D wall WPC panels, polymer based materials, steel/concrete composite bridge decks, fibre reinforced plastics structural insulated panels.	**03**		**3**
New Techniques in Constructions-Introduction, 3D printing, photo catalytic admixture, self-healing concrete, Biomaterials, zero cement concrete ,hemp lime, wood-glass epoxy composites, bamboo.	**04**		**3**
	07		

Unit No.4 Testing Procedures of Materials

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Material Testing, Machines and Equipment Requirements---Necessity of material testing, various testing methods, destructive tests, classification of destructive tests---static, impact and cyclic testing,non-destructive testing- its classification ,visual inspection, penetration test, ultrasonic test.	**03**		**4**
Testing Procedures for bricks, reinforcing steel, fine aggregates, coarse aggregates. Documenting the experimental program, including the test procedures, collected data, method of interpretation and final results.	**04**		**4**
	07		

Unit No.5 Testing and Evaluation Procedures of Materials

Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Quality control- Use of test data/ testing reports in the material selection for various civil engineering projects /construction, Sampling, Acceptance criterion,	**04**		**5**
Code of practice and guidelines in this regards for Cements; Aggregates; Concrete (plain and reinforced); Soils; Bitumen and asphaltic materials; Timbers; Glass and Plastics; Structural Steel.	**03**		**5**

	07		

References							
Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
1,2	'Building Construction Handbook	Chudley, R., Greeno (2006),	R. Butterworth-Heinemann	(6th ed.)	√		
4	Mechanical Testing of Engineering Materials,	Kyriakos Komvopoulos (2011),	Cognella				√
1,2,4	' Highway Materials and Pavement Testing'	Khanna, S.K., Justo, C.E.G and Veeraragavan	Nem Chand & Bros,	Fifth Edition	√		
1,2,3	Mechanical Behaviour of Materials	E.N. Dowling (1993)	Prentice Hall, International Edition				√
1-5	Building Materials,Testing, and Sustainability	N. Subramania	Publisher: Oxford University Press, New Delhi				√
1-5	Related papers published in international journals					√	

List of Code/Handbook			
Applicable for Unit No.	Title of Code	Type of code	Year of Publication
	IS: 456 – code of practice for plain and reinforced concrete.		2000/2016
	IS: 2386 – methods of tests for aggregate for concrete.		1963
	10262; SP 23 – codes for designing concrete mixes.		2009/2019

	IS: 13311 – ultrasonic testing of concrete structures.		1992
	IS:1199 - Fresh Concrete – Tests		2018
	IS:3495 - Burnt Clay Bricks Tests		1992/2016
	IS:1786 –High strength deformed steel bars and wires for concrete reinforcement— specification		2008
	IS:2062 - Hot rolled medium and high tensile structural steel — specification		2011
	IS:1608 - Metallic Materials — Tensile Testing (Part 1-3)		2005/2018
	IS:1599 - Methods for bend test		2012
	American Society for Testing and Materials (ASTM),	Annual Book of ASTM Standards	(post 2000)
	BIS, IRC, ASTM, RILEM, AASHTO, etc. corresponding to materials used for Civil Engineering application		

(Dr. A.N. Dabhade)
BOS Member

(Dr. Avinash N Shirkhande,)
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B. TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem: VIII	**Total Hours Distribution per week**		
Total Credit: 03	**Lecture (L): 03 Hrs**	**Tutorial/Activity (T/A):00 Hrs.**	**Practical (P): 00 Hrs.**
Subject Code	**BTCVE803T**	**Name of Subject: Introduction to Civil Engineering Profession (Open Elective-III)**	

Examination Scheme			
Internal Marks:	**University Marks:**	**Minimum Passing Marks:**	**Examination Duration:**
30 Marks (15marks for sessional Examination) (15 Marks for Activity based)	**70 Marks**	**45 Marks**	**3 Hours**

Outline:

The course introduces the civil engineering profession and the degree programme to first year students and prospective students. The different disciplines of civil engineering are briefly explained, along with the pre-requisites, scope and opportunities. Career prospects and novel/emerging areas are also presented. This should be a compulsory first course in civil engineering to present the perspective for the undergraduate students.

SYLLABUS

Unit No.	**Content**	**Allotted Hours**
Unit No. I	What is Civil Engineering, Different disciplines of civil engineering. scope and prospects. Heritage structures, architecture, Highway Engineering. Traffic Engineering and Planning	**07**
Unit No. II	Environmental Engineering. Prevention of environmental impact. Pollution, waste and water treatment, Automation and Robotics in Construction. Water Security	**07**
Unit No. III	Geotechnical Engineering. Soil mechanics and foundations. Hydraulics and water resources	**07**
Unit No. IV	Construction Materials and Methods. Infrastructure Engineering. g. Analysis, design and modelling, l	**07**

A.N. Dabhade)
BOS Member

(Dr. Avinash N Shirkhande,)

Applicable for Unit No.	Website address
For syllabus	https://archive.nptel.ac.in/content/syllabus_pdf/105106201.pdf
I to V	https://nptel.ac.in/courses/105106201