YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING
(An Autonomous Institution affiliated to R T M Nagpur University Nagpur)
Accredited by NAAC (1st Cycle) with 'A' Grade (Score 3.25 on 4 Point Scale)
Wanadongri, Hingna Road, Nagpur-441110

Department of Civil Engineering
(Minor in CE)

B.E. Minor in Civil Engineering
SoE & Syllabus 2021-22

Information Brochure of Minor Program

1. Title of Program: **B.E. Minor in Civil Engineering**
2. Type of Program : **Minor**
3. Department offering the program: **Civil Engineering**
4. Industry Associated:
   1. **Sun Enviro Technologies Pvt. Ltd,**
      Central Excise Layout, Khamla, Nagpur,
      Maharashtra 440025, India
   2. **NEO Infrastructure Consultants,**

5. The students from **EL, ME, EE, ETC, CT, IT, CSE** are eligible to opt for this program. ***Department of Civil Engineering students are not permitted to opt for the program.***

6. General information about courses in program:

The minor is a subject offered by a department to the students other than the parent department. A student can do Majors in chosen filed as per the career goal, and a minor may be chosen to enhance the major thus adding the diversity, breadth and enhanced skills in the field. The minor in civil engineering opens opportunities for students who are interested in gaining knowledge across the university and would like an overview of the principles of civil engineering. The purpose of the Minor in Civil Engineering is to give students with sufficient background in the field of civil engineering.

The Program of Minor in Civil Engineering includes the fundamental subjects like Strength of Materials, Basics of Building Construction, Water Supply and Sanitation, Fundamentals of Transportation Engineering and Civil Engineering Materials. The Strength of Materials subject gives the idea about the behaviour of materials or structures when subjected to various types of forces. The Basics of Building Construction includes the all aspects of construction like Building Planning, Designing and Materials and amenities requirements etc. Water Supply and Sanitation course focus on the aspects like water supply, water quality, treatment and

distribution of water, sewage collection, treatment and disposal. The Fundamentals of Transportation Engineering gives overview of all types of transport system like road, railway, metro, air and water transport.

7. Advance knowledge or research orientation of Program

The Programme is designed to impart knowledge about basic knowledge in the field of civil engineering.

The knowledge gained will be helpful in developing interest and carry out inter disciplinary research

work.

The program will help students to gain knowledge in civil engineering by studying further.

This programme will help students to become successful entrepreneurs as this requires knowledge of

multiple areas. The students can pursue higher studies in fields of their interest and management.

8. Employability potential of program:

While individuals with an associate degree may qualify for some entry-level positions, most civil engineering careers call for at least a bachelor's or master's. For this reason, candidates should expect to earn at least a four-year degree, though advanced positions often call for graduate education. Careers may also mandate licenses, certifications, and/or field experiences. A great place for candidates to start is by researching requirements for their career goals and choosing programs that match those criteria. When deciding on a career path it is very difficult to know whether your chosen industry will continue growing, become oversaturated or even become completely redundant. It is clear that the trend is towards information technology and automation and this is set to remain the case for the foreseeable future. Traditional fields such as civil engineering is still in high demand.

9. Departmental Steering committee:

SN	Name of the Faculty Member	Post	Designation	e-mail ID	Contact Number
1	Dr. V.G. Meshram	Chairman	Associate Professor & Head	hod_ce@ycce.edu	9850340838
2	Dr. S.R. Khandeshwar	Member	Professor	khandeshwar333@yahoo.com	9822578533
3	Dr. S.V. Ambekar	Member	Professor	sv_ambekar@rediffmail.com	9422105597
4	Dr. A.R Gajbhiye	Member	Professor	yccehodcivil@yahoo.in	9850958980

10. Departmental coordinator

SN	Name of the Faculty Member	Post	Designation	e-mail ID	Contact Number
1	Dr. Ms. M.S. Bhagat	Co-Ordinator	Assistant Professor	msbciv2gmail.com	7620494011

Scheme of Examinations

B.E Minors in Introduction to Civil Engineering														
SN	Sem	Sub Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
					L	T	P	Hrs		MSEs*	TA	ESE	
1	V	CVM101	Strength of Materials	**T**	3	0	0	3	3	30	30	40	3
2	V	CVM102	**Lab-** Strength of Materials	**P**	0	0	2	2	1		60	40	
3	VI	CVM111	Basics of Building Construction	**T**	3	0	0	3	3	30	30	40	3
4	VI	CVM112	Water Supply and Sanitation	**T**	3	0	0	3	3	30	30	40	3
5	VI	CVM113	**Lab-** Water Quality Analysis	**P**	0	0	2	2	1		60	40	
6	VII	CVM121	Fundamentals of Transportation Engineering	**T**	3	0	0	3	3	30	30	40	3
7	VII	CVM122	Civil Engineering Materials	**T**	3	0	0	3	3	30	30	40	3
8	VII	CVM123	**Lab-** Civil Engineering Materials	**P**	0	0	2	2	1		60	40	
			TOTAL		**15**	**0**	**6**	**21**	**18**				

MSEs* = Three MSEs of 15 Marks each will conducted and marks of better 2 of these 3 MSEs will be considered for Continuous Assessment

TA ** = for Theory : 20 marks on lecture quizzes, 8 marks on assignments, 2 marks on class performance

TA = for Practical : MSPA will be 15 marks each**

V Semester

CE	CVM101 : Strength of Materials			L=3	T=0	P=0	Credits= 3
Evaluation Scheme *Best Two out of three MSE's would be considered	MSE-I*	MSE-II*	MSE-III*	TA	ESE	Tota	ESE Durat ion
	15	15	15	30	40	100	3 Hrs.
Prerequisites							

COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to 1. To analyze the structural elements and find stresses. 2. To compute quantities of S.F. and B.M. and principal stresses. 3. To determine the deflections in beams by various methods which is an important criteria in design 4. To investigate state of stress in three dimensions and various theories of failure in designing the structural members 5. To interpret failure pattern of metal under different action	Students should be able to 1. Understand basic concepts and mechanical properties of materials. 2. Analyze behavior of material under various types of loading pattern. 3. Illustrate diagram showing variation of shear force, bending moment and stresses. 4. Outline the feasibility of different sections subjected to different loading patterns.
Mapped Program Outcomes : 1, 2, 10,	

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UNIT–1 : **Simple Stresses and Strains:** Stress- tensile and compressive, strain, strain energy, stress-strain diagram, properties of materials, impact loading, varying cross-section and load, temperature stresses.	**[06 Hrs.]**
UNIT–2 : **Shear force and bending moment diagram:** Axial force, shear force and bending moment diagram. Relation between bending moment, shear force and loading.	**[07 Hrs.]**
UNIT–3 : **Stresses in beam:** Theory of simple bending, Bending stresses in simple beam. Shear stresses in simple beams and shear stress distribution.	**[06 Hrs.]**
UNIT–4 : **Torsion of Shaft:** Torsion of circular sections, assumptions and derivation of relation between torsional moment, shear stress and angle of twist.	**[07 Hrs.]**
UNIT–5 : **Deflection of Beams**: Derivation of differential equation of elastic curve, Differential Equation relating deflection moment, shear and load.	**[07 Hrs.]**

UNIT–6 : **Compound Stress and Strains:** State of stress at a point, Oblique stress, simple tension, pure shear, general two-dimensional stress system, principle planes, principle stresses and strains, Poisson's ratio, Maximum shear stress.	**[06 Hrs.]**

Text Books:

	Title	Edition	Author	Publisher
1	Strength of Materials	3rd Edition	Bhavikatti S. S	Vikas Publication House Pvt. Ltd., Noida, UP,
2	Engineering Mechanics of Solids	4th Edition	Popov E.P	Printice Hall,

Reference Book:

	Title	Edition	Author	Publisher
1	Strength of Materials		Chakraborti, M.,	S. K. Kataria& Sons
2	Mechenics of Material		Pytel A., Kivsalaas J.,	Cengage Learning, (Indian Edition),
3	Strength of Materials and Machine Element	2nd Edition	Shah V.L., Ogale R.A	Jain Book Agency, New Delhi

V Semester

CVM102	LAB : Strength of Materials			L=0	T=0	P=1	Credits=1
Evaluation Scheme	MSPA-I	MSPA-II	MSPA-III	TA	ESE	Total	ESE Duration
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COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to 1. To study suitability of various materials for civil engineering construction. 2. To study the resistance offered by various materials against the external forces	Students should be able to 1. Understand basic concepts & mechanical properties of material. 2. Categorize behavior of various materials such as Steel, Aluminum, Wood etc. when subjected to various types of loading.
Mapped Program Outcomes : 1, 2	

PRACTICAL:
Minimum **Ten** practical to be performed from the list as below:-

1. To study the universal testing machine and its accessories.
2. To determine tension test on metal.
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 and Izod Impact Test.
6. To determine Rockwell hardness number for M.S. and Aluminium bar.
7. To determine Brinell hardness number for M.S. and Aluminium bar.
8. To determine the stiffness of spring and modulus of rigidity.
9. To perform shear test on metals.
10. To determine the compressive strength of specimen.
11. To determine flexural test on roofing tiles, flooring tiles and bricks.
12. To determine the test on masonry bond strength of bricks.

V Semester

CVM111	Basics of Building Construction			L=3	T=0	P=0	Credits= 3
Evaluation Scheme *Best Two out of three MSE's would be considered	MSE-I*	MSE-II*	MSE-III*	TA	ESE	Tota	ESE Duration
	15	15	15	30	40	100	3 Hrs.
Prerequisites							

COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to 1. To understand the importance Building Materials used for Brick / stone masonary, Windows and doors, flooring and roofs. 2. To understand the importance of Building Planning. 3. To understand the importance of Building Design.	Students should be able to 1. Identify different building materials. 2. Demonstrate properties of different material. 3. Apply various principles of building planning.
Mapped Program Outcomes : 1, 6, 7, 9	

UNIT–1 : **Building materials** A) Stones : Stones Requirements of good building stones, IS specification and tests on stones; stone masonry B) Brick and block masonry: Characteristics of good building bricks, IS specifications and test; Classification of bricks.	**[06 Hrs.]**
UNIT–2 : **Materials for Doors and windows** Functional requirements, materials of doors and windows, glazing, method of fixing doors and windows, fixtures and fastenings. Timber Types and properties, seasoning, testing; Glass – Types and properties.	**[07 Hrs.]**
UNIT–3 : **Flooring and Roof material,** (A) Flooring materials, tests and IS specifications: Ground and upper floors; Flooring functional requirements of flooring material, varieties of floor finishes and their suitability. (B) Roofing materials: GI, AC, fiber sheets, Mangalore tiles; Roof construction – types and their suitability.	**[06 Hrs.]**
UNIT–4 : **Miscellaneous materials** Properties , types and uses of following materials, Lime, Ferrous metals, Polymers, Plastics types, Mastic, Gypsum, Ferro Crete, Clay Tiles and glazed ware, Plaster of Paris. Artificial stone; Aluminium and alloys– Properties.	**[06 Hrs.]**

UNIT–5 : **Building planning** Principle of Building planning, Integrated approach in Built Environment, Building Rules and Byelaws, Necessity of laws, plot sizes, road width, open spaces, floor area ratio (F.A.R.), marginal distances, building line control line, height regulation, Built-up area, floor area, carpet area, Landscape elements and elements of interior decoration.	**[07 Hrs.]**
UNIT–6 : **Building Design** Introduction, Types of load, thermal insulation of roofs and walls. Ventilation : Necessity of ventilation, stack effect, wind effect, Mechanical ventilation, objectives, selection of ventilation system, ventilation rate, Lighting**:** Principles, Day lighting, design of windows, sky component, E.R.C, Orientation, artificial illumination, supplementary illumination.	**[07 Hrs.]**

Text Books:

	Title	Edition	Author	Publisher
1	Building drawing an Integrated approach to Built environment	Fifth edition	Shah M.G., Kale C.M. and Patki S.Y	Tata McGraw Hill
2	Building Design and Constructions	Second edition	Mentt	Tata McGraw Hill

Reference Book:

	Title	Edition	Author	Publisher
1	National Building Code of India 2016			Bureau of Indian Standard, New Delhi
2	Materials of Construction		Ghosh	Tata McGraw Hill
3	Materials for Civil and Construction Engineers	3rd Ed.,	M. S. Mamlouk and J. P. Zaniewski	Prentice Hall
4	Building Materials		P.C. Varghese	PHI Learning Pvt. Ltd., India
5	Civil Engineering Materials		TTTI Chandigrah	Tata McGraw Publication

VI Semester

CVM112	Water Supply and Sanitation			L=3	T=0	P=0	Credits= 3
Evaluation Scheme *Best Two out of three MSE's would be considered	MSE-I*	MSE-II*	MSE-III*	TA	ESE	Tota	ESE Duration
	15	15	15	30	40	100	3 Hrs.
Prerequisites							

COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to 1. To study various components of public water supply scheme. 2. To study water quality and water treatment. 3. To study sewage collection and conveyance. 4. To study the working of sewage treatment units and processes.	Students should be able to 1. Explain water supply scheme and its importance. 2. Discuss the water quality and water treatment. 3. Explain the effective sewage collection, conveyance and construction of sewerage system. 4. Discuss the working of sewage treatment units and processes.
Mapped Program Outcomes : 1, 2, 7,	

UNIT–1 : Introduction, Importance necessity of water supply scheme, water demand, population forecasting methods, numerical, intake structures, conveyance of water and pumps.	**[07 Hrs.]**
UNIT–2 : Water quality, general idea of water borne diseases, characteristics of water, standards of drinking water, water treatment, objective of treatment, conventional water treatment plant flow sheet, aeration, coagulation and sedimentation.	**[07 Hrs.]**
UNIT–3 : Filtration, types of filters, disinfection, chlorination, distribution systems, layouts of DS and storage reservoirs for treated water.	**[06 Hrs.]**
UNIT–4 : System of collection, conveyance of sewage, sewer types, shapes, construction of sewer, sewer appurtences, sewer testing and maintenance.	**[06 Hrs.]**
UNIT–5 : Characteristics of wastewater, BOD, COD, BOD rate constant, sewage treatment flow sheet & site selection for sewage treatment plant, preliminary and primary treatment.	**[07 Hrs.]**

UNIT–6 : Secondary treatments, biological treatment, activated sludge process, trickling filter, methods of disposal, sludge digestion & sludge drying beds, recycle & reuse of sewage.	**[06 Hrs.]**

Text Books:

	Title	Edition	Author	Publisher
1	Water Supply & Sanitary Engineering (Vol.–I & II),		Modi P.N	Standard Book
2	Water Engineering & Sanitary Engineering	2nd Edition	Punmia B. C	Laxmi Publication, New Delhi
3	Water Supply and Sanitary Engineering	4th Edition	Birdie G.S., Birdie J.S	DhanpatRai Publication, New Delhi
4	Water Supply Sanitary Engineering		S. K. Garg	Khanna Publications

Reference Book:

	Title	Edition	Author	Publisher
1	Water supply and Sewarage,	6th Edition	E.W. Steel, T.J. McGhee	McGraw-Hill Education
2	Water and wastewater Engineering		Fair, Geyer and Okun	John Wiley & Sons Ltd

VI Semester

CVM113	LAB : Water Quality Analysis			L=0	T=0	P=1	Credits=1
Evaluation Scheme	MSPA-I	MSPA-II	MSPA-III	TA	ESE	Total	ESE Duration
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COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to 1. To study various components of public water supply scheme. 2. To study water quality and water treatment. 3. To study sewage collection and conveyance. 4. To study the working of sewage treatment units and processes.	Students should be able to 1. Explain water supply scheme and its importance. 2. Discuss the water quality and water treatment. 3. Explain the effective sewage collection, conveyance and construction of sewerage system. 4. Discuss the working of sewage treatment units and processes.
Mapped Program Outcomes : 1, 2, 7,	

PRACTICALS : -

Minimum of **Ten** practical from the list given below shall be performed.

1. Determination of pH.
2. Determination of Conductivity
3. Determination of Chlorides
4. Determination of Solid's
5. Determination of Turbidity
6. Determination of Alkalinity
7. Determination of Acidity.
8. Determination of Dissolved Oxygen.
9. Determination of Hardness
10. Determination of Available Chlorine
11. Determination of Residual Chlorine
12. Determination of OCD by Jar Test.
13. Bacteriological MPN tests.
14. Bacteriological Plate count test.
15. B.O.D. test
16. C.O.D. test

VI Semester

CVM121	**Fundamentals of Transportation Engineering**			**L=3**	**T=0**	**P=0**	**Credits= 3**
Evaluation Scheme *Best Two out of three MSE's would be considered	MSE-I*	MSE-II*	MSE-III*	TA	ESE	Tota	ESE Duration
	15	15	15	30	40	100	3 Hrs.
Prerequisites							

COURSE OBJECTIVES	**COURSE OUTCOMES**
Students should be able to 1. To understand importance of transportation. 2. To acquaint development in transportation. 3. To study basics of various modes of transportation. 4. To understand Traffic engineering regulations.	Students should be able to 1. Identify the basic knowledge of Transportation engineering. 2. Explain the concepts of various modes of transportation. 3. Illustrate the characteristics of traffic engineering. 4. Distinguish appropriate regulations as per various Traffic engineering.
Mapped Program Outcomes : 1,2,11	

UNIT–1 : Importance of Transportation in Nation Development, Different modes of Transportation, Introduction to Road Transportation.	**[06 Hrs.]**
UNIT–2 : Traffic Engineering: users, regulations, signs, signals.	**[07 Hrs.]**
UNIT–3 : Introduction to various organizations and government bodies for transportation sector in India.	**[06 Hrs.]**
UNIT–4 : Introduction to Railway transportation & Metro and its development.	**[07 Hrs.]**
UNIT–5 : Introduction to Air transportation and development.	**[07 Hrs.]**
UNIT–6 : Introduction to Water transportation and its development.	**[06 Hrs.]**

Text Books:				
	Title	**Edition**	**Author**	**Publisher**
1	Highway engineering		Khanna& Justo	Nem Chand & Bros
2	Highway Engineering		K.L. Bhanot	S. Chand &Company (P) Ltd. New Delhi
3	Railway Engineering		Saxena	Dhanpat Rai Publication
	Airport Planning & Design		Goyal& Praveen Kumar	Galgotia Publication
4	Railway Engineering		Rangwala	Charotar Publishing House
5	Airport Engineering		Rangwala	Charotar Publishing House
6	Dock and Tunnel Engineering	26th Edition	Srinivasan R. Harbour	
Reference Book:				
	Title	**Edition**	**Author**	**Publisher**
1	Indian Road Congress, IRC handbooks			International Code Council
2	Textbook on Transportation Engineering		S.P. Chandola	S. Chand Publishers, New Delhi

VII Semester

CVM122	Civil Engineering Materials			L=3	T=0	P=0	Credits= 3
Evaluation Scheme *Best Two out of three MSE's would be considered	MSE-I*	MSE-II*	MSE-III*	TA	ESE	Tota	ESE Durat ion
	15	15	15	30	40	100	3 Hrs.
Prerequisites							

COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to 1. To understand the importance Civil Engineering Material used for Construction Materials 2. To study fundamentals of cement &concrete. 3. To study new Construction Materials and its uses.	Students should be able to 1. Identify different Construction Materials. 2. Explain various constituents of Cement & Concrete 3. Demonstrate properties of different material.
Mapped Program Outcomes : 5,7,9,11	

UNIT–1 : **Introduction to Civil Engineering Material-**Scope of the Subject, Selection Criteria of Construction Material, Classification of Civil Engineering Material, Properties of Civil Engineering Material.	**[06 Hrs.]**
UNIT–2 : **Introduction to** Cement, its Type, Properties and Uses of cement, Ingredients of cement, Manufacture of cement (Flow Diagram), Composition and function of cement clinker, Standard test of cement, Cement water Proofers, Admixtures.	**[07 Hrs.]**
UNIT–3: **Introduction to Stones & Bricks: -** Stone as building material, Criteria for selection, Tests on stones, Deterioration and Preservation of stone work. Bricks, Classification, Manufacturing of clay bricks, various tests etc.	**[06 Hrs.]**
UNIT–4 : **Introduction to Concrete:-** Introduction to IS-456 **(**Plain And Reinforced Concrete),Ingredients, Manufacturing Process, Batching plants, mixing, transporting, placing, compaction of concrete, curing and finishing, Ready mix Concrete, Mix specification.	**[06 Hrs.]**
UNIT–5 : **New Construction Materials:** Fibers and its types, Pre - Engineered Building and its Application & Advantages.	**[07 Hrs.]**

UNIT–6 : **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.	**[07 Hrs.]**

Text Books:

	Title	Edition	Author	Publisher
1	Concrete Technology	6th Edition	M.S. Shetty	S. Chand & Company, Limited,.
2	Building Construction	32nd Edition	Rangwala	Charotar Publishing House Pvt. Ltd

Reference Book:

	Title	Edition	Author	Publisher
1	Construction Technology		Sankar, S.K. and Saraswati, S.,	Oxford University Press, New Delhi
2	Building Construction	19th Edition	Sushil Kumar	Standard Publisher Distributors , New Delhi
3	Elements of Civil Engineering		S. S. Bhavikatti	Vikas Publishing House Pvt Limited
4	Basic Civil Engineering		By Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain	Firewall Media

VII Semester

CVM123	LAB : Civil Engineering Materials			L=0	T=0	P=1	Credits=1
Evaluation Scheme	MSPA-I	MSPA-II	MSPA-III	TA	ESE	Total	ESE Duration
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COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to 1. To understand the importance Civil Engineering Material used for Construction Materials 2. To study fundamentals of cement &concrete.. 3. To study new Construction Materials and its uses.	Students should be able to 1. Identify different Construction Materials. 2. Explain various constituents of Cement & Concrete 3. Demonstrate properties of different material.
Mapped Program Outcomes : 5,7,9,11	

1. To determine the normal consistency and initial setting time and final setting time by Vicat's apparatus.
2. To perform soundness test of cement.
3. To determine water absorption of roofing tiles, flooring tiles and bricks.
4. To determine the bulking of sand & plotting bulking curve.
5. To determine the compressive strength of cement.
6. To determine the workability of concrete by slump cone apparatus.
7. To determine the workability of concrete by Vee bee apparatus.
8. To determine the compressive strength of brick
9. To design the concrete mix of required characteristic strength according to I.S .method.
10. To determine surface hardness by using Rebound hammer.
11. To Determine Compressive strength of High grade concrete by using different admixture.
12. To Study of IS code related to mix design