

### Mathematics – III

Total Credits: 3+1=4

Teaching Scheme

Lectures/Tutorial: 3/1

Subject Code: ~~BECVE301T~~

Examination Scheme

Theory T (U): 70 Marks, T (I): 30 Marks

Duration of University Exam: 3 hours

#### Course Objectives:

1. A primary objective is to introduce and develop advanced mathematical skills of students that are imperative for effective understanding of engineering subjects.
2. The topics covered will equip them with the techniques to understand advanced level Mathematics and its applications that would enrich logical thinking power.

#### Course Outcomes:

After completing the course, students will be able to

1. Apply Laplace Transform to solve ordinary differential equations, Integral equations and Integro-differential Equations.
2. Apply Fourier series in the analysis of periodic functions in terms sine and cosine encountered in engineering problems and Fourier Transform to solve integral equations.
3. Learn the concept of differentiating, integrating and expanding of analytic functions in complex numbers and their applications such as evaluation of integrals of complex functions.
4. Solve partial differential equations of first order, higher order with constant coefficients and of second order using method of separation of variables.
5. Analyze real world scenarios to recognize when matrices are appropriate, formulate problems about the scenarios, creatively model these scenarios in order to solve the problems using multiple approaches.
6. Understand the impact of scientific and engineering solutions in a global and societal context.
7. Create the groundwork for post-graduate courses, specialized study, and research in mathematics.

#### Unit 1: LAPLACE TRANSFORM

(10 Hrs)


Definition, Properties (Statement only), Evaluation of integrals by Laplace transform, Inverse Laplace transform using partial fraction method and properties of Laplace transform, Convolution theorem (Statement only), Laplace transform of periodic functions (Statement only), Unit step function and unit impulse function (Statement only), Applications of Laplace transform to solve ordinary differential equations, Integral equations & Integro-differential equations.

#### Unit 2: FOURIER SERIES & FOURIER TRANSFORM

(10 Hrs)

**Fourier Series:** Periodic functions and their Fourier expansions, Even and odd functions, Change of interval, Half range expansions.

**Fourier Transform:** Definition and Properties (excluding FFT), Fourier integral theorem, Applications of Fourier transform to solve integral equations.

  
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**Unit 3: FUNCTIONS OF COMPLEX VARIABLES****(10 Hrs)**

Analytic function, Cauchy-Riemann conditions, Harmonic function (Excluding orthogonal system), Milne-Thomson method, Cauchy integral theorem & integral formula (Statement only), Taylor's & Laurent's series (Statement only), Zeros and singularities of analytic function, Residue theorem (Statement only).

**Unit 4: PARTIAL DIFFERENTIAL EQUATIONS****(10 Hrs)**


Partial differential equations of first order first degree i.e. Lagrange's form, Linear homogeneous equations of higher order with constant coefficients, Method of separations of variables, Simple applications of Laplace transform to solve partial differential equations (One dimensional only).

**Unit 5: MATRICES****(8 Hrs)**

Linear dependence of vectors, Eigen values and Eigen vectors, Reduction to diagonal form, Singular value decomposition, Sylvester's theorem (Statement only), Largest eigen value and corresponding eigen vector by iteration method.

**Text/Reference Books:**

- (1) Advanced Engineering Mathematics (Wiley), Erwin Kreyzig.
- (2) Higher Engineering Mathematics (Khanna Publishers), B. S. Grewal.
- (3) Advanced Engineering Mathematics (S. Chand), H. K. Dass.
- (4) Applied Mathematics for Engineers and Physicists, L. A. Pipes and L. R. Harville.
- (5) Advanced Mathematics for Engineers, Chandrika Prasad.
- (6) A text book of Engineering Mathematics (Laxmi Publication), N. P. Bali & M. Goyal.

  
Pashar G. Shende  
Member, BCS civil Engg.



**RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR**  
**FACULTY OF SCIENCE & TECHNOLOGY**  
**BE CIVIL ENGINEERING**

**(CHOICE BASED CREDIT SYSTEM)**

Sem: III (3 <sup>rd</sup> )	Total Hours Distribution per week		
Total Credit: 3	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): NA	Practical (P): 1 Hr.
Subject Code	BECVE302T	FLUID MECHANICS	
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

<b>Course Objectives</b>	
1	To impart the importance and practical significance of various fluid properties
2	To discuss and evaluate various forces acting on partially and fully submerged bodies
3	To discuss and evaluate the importance of various parameters on the fluid motion.
4	To discuss various flow measuring devices with their practical applications
5	To deliberate the concept of impulse momentum principle, dimensional analysis and model analysis of a fluid phenomenon

<b>Course Outcomes</b>	
After completion of syllabus, students would be able to	
1	Understand the importance and practical significance of various fluid properties
2	Comprehend and estimate various forces acting on partially and fully submerged bodies
3	Evaluate the importance of various parameters on the fluid motion.
4	Know various flow measuring devices with their practical applications
5	Illustrate the concept of impulse momentum principle, dimensional analysis and model analysis of a fluid phenomenon

## MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Subject Code & CO NO.												
CO1	3	3										
CO2	3	3	1									
CO3	3	3	2									
CO4	3	3	1									
CO5	3	3	2	1								

1 Low

2 Medium

3 High



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**BE - CIVIL ENGINEERING**

(CHOICE BASED CREDIT SYSTEM)

**BECVE302T - FLUID MECHANICS**

**SYLLABUS**

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
<b>UNIT NO.1 (INTRODUCTION)</b>			
<p>1. <b>Fluid Mechanics and its importance</b> in Civil Engineering, Rheological diagram and its significance.</p> <p>2. <b>Fluid Properties:</b> Basic Properties, Viscosity and its Significance, Surface Tension, Capillarity, Compressibility, Vapour Pressure.</p> <p>3. <b>Pressure and its measurement:</b> Pressure at a point and its representation, atmospheric and gauge pressure, Pressure measurement by manometer, information about mechanical and digital pressure gauges.</p>			
<b>UNIT NO.2</b>			
<p>1. <b>Hydrostatics:</b> Total Pressure and centre of pressure on for a plane surface and curved surface immersed in fluid. Numerical Problems.</p> <p>2. <b>Stability of Floating Bodies:</b> Archimedes Principle, Metacentre and centre of buoyancy, Metacentric height and its determination, Stability of floating bodies partially submerged and fully submerged.</p> <p>3. <b>Fluid masses</b> subjected to relative equilibrium, effect of horizontal and vertical acceleration on the moving fluid masses.</p>			
<b>UNIT NO.3</b>			
<p>1. <b>Kinematics of Flow:</b> Euler and Lagrangian approaches, velocity and acceleration of fluid, local and convective acceleration, Continuity equation, Stream function and velocity potential functions, Streamline, Path line and streak lines.</p> <p>2. <b>Kinetics of Flow:</b> Forces acting on a fluid mass, Euler's Equation of motion, Bernoulli's Equation.</p>			



<b>UNIT NO. 4</b>			
<b>Flow measuring Devices:</b> (a) For pipeline- Venturimeter, orifice meter, Nozzle meter, Pitot Tube for velocity measurement (b) For tank- Orifice and its types, hydraulic coefficients, mouth piece and its types. (c) For Open Channel- Notches and weirs, velocity of approach, End contraction, Sharp crested, broad crested weir and Labrynth weir			
<b>UNIT NO. 5</b>			
1. <b>Impulse momentum principle</b> and its application, impact of jet, concept of velocity triangle. 2. <b>Dimensional Analysis</b> , Dimensionally Homogenous equation, Methods of Dimensional Analysis, Dimensionless numbers 3. <b>Model Analysis</b> : Types of similarities, Reynold's and Froude's model law, Distorted and Undistorted model.			

References			
Name of Book	Name of Author	Name of Publisher	Edition
Hydraulics, Fluid Mechanics and Hydraulic Machines	P.N. Modi & S.M. Seth	Standard Book House, Delhi	21 <sup>st</sup> (2017)
A Text Book of Fluid Mechanics and Hydraulic Machines	R.K. Bansal	Laxmi Publications (P) Ltd., New Delhi	9 <sup>th</sup> (2005)
A Text Book of Fluid Mechanics and Hydraulic Machines	R.K. Rajput	S Chand & Company (P) Ltd., New Delhi	6 <sup>th</sup> (2015)
Fluid Mechanics including Hydraulic Machines	A.K. Jain	Khanna Publishers	(2006)
Hydraulics, Fluid Mechanics and Fluid Machines	S. Ramamrutham	Dhanpat Rai Publishing Co., New Delhi	9 <sup>th</sup> (2011)

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BE - CIVIL ENGINEERING  
(CHOICE BASED CREDIT SYSTEM)**

Sem: III (3 <sup>rd</sup> )	Total Hours Distribution per week		
Total Credit : 1	Practical (P): 2 Hrs.		
Subject Code	BECVE302P	FLUID MECHANICS	
Examination Scheme - Practical			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
25 Marks	25 Marks	25 Marks	--

**List of Experiments:**

1. Determination of Metacentric height and its importance.
2. Calibration of Venturimeter and its practical utility
3. Calibration of Orifice meter and its practical utility
4. Calibration of Rectangular Notches/ V-Notches.
5. Calibration of Rectangular Notches/ V-Notches
6. Hydraulic Coefficients of an orifice.
7. Hydraulic Coefficients of a Mouthpiece.
8. Verification of Bernoulli's Theorem
9. Impact of jet apparatus

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**(CHOICE BASED CREDIT SYSTEM)**

Sem: III (3 <sup>rd</sup> )	Total Hours Distribution per week		
Total Credit : 4	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): 1 Hr.	
Subject Code	BECVE303T	SOLID MECHANICS	
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

<b>Course Objectives</b>	
<b>1</b>	To determine the Mechanical behavior of the body by determining the stresses, strains produced by the application of load and to apply the fundamentals of simple stresses and strains.
<b>2</b>	To determine the Shear Force and Bending Moment at a section for different condition.
<b>3</b>	To facilitate the concept of bending and its theoretical analysis in a beam To determine the Bending and shear stress in a given beam.
<b>4</b>	To develop slope and Deflection equations for beams subjected to various loads.
<b>5</b>	To determine the torsion in circular section, Direct and Bending Stresses

<b>Course Outcomes</b>	
<b>After completion of syllabus, students would be able to</b>	
<b>1</b>	Understand the behaviour of materials under different stress and strain conditions.
<b>2</b>	Evaluate and draw shear force diagram and bending moment diagram and their relation.
<b>3</b>	Formulate the bending and shear stresses equations and able to draw bending and shear stress diagrams.
<b>4</b>	Formulate slope and Deflection equations for beams subjected to various loads by Macauleys method
<b>5</b>	Analyze and Evaluate the torsion in circular section, Direct and Bending Stresses



## MAPPING OF CO WITH PO

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

1 Low

2 Medium

3 High



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**(CHOICE BASED CREDIT SYSTEM)**  
**BECVE303T - SOLID MECHANICS**

**SYLLABUS**

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
<b>UNIT NO.1 (STRESS AND STRAIN)</b>			
Concept of stress and strain, Stress-Strain diagrams and their characteristics for mild steel and TOR Steel.	2	1	1
Stresses and strains in simple, composite bars in uniaxial tension and compression,	3	1	
Temperature stresses in simple restrained bars, composite bar.	2	1	
Elastic Constants and Relation between them. Introduction to Biaxial and triaxial loading.	1	1	
<b>UNIT NO.2 (SHEAR FORCE AND BENDING MOMENT)</b>			
Types of Beams. Shear Force and Bending Moment	1	1	2
Relation between Bending Moment and Shear Force	1	1	
Bending Moment Diagram and Shear Force Diagrams	5	1	
<b>UNIT NO.3 (STRESSES IN BEAMS)</b>			
Bending Stresses in Beams, Assumptions and derivation of simple bending theory	2	1	3
relation between bending moment, bending stress and curvature of homogeneous and composite beams,	2	1	
Shear stresses in simple beams, Shear flow and shear stress distribution,	2	1	
shear stress in composite beams, combined effect of bending moment and axial force.	2	1	
Principal stresses, maximum shear stresses	2	1	



UNIT NO.4 (DEFLECTION OF BEAMS)			
Differential equations of the deflection curve. Bending of uniformly loaded beams.	1	1	4
Deflection of simply supported beam loaded by a concentrated load.	2	1	
Introduction to Macauleys method. Deflection of a simply supported and cantilever beam by the Macauleys method.	2	1	
Method of superposition. The deflection of beams with overhangs.	2	1	
UNIT NO.5 (TORSION, DIRECT AND BENDING STRESSES)			
Direct and Bending Stresses	2	1	5
Torsion of circular section, assumptions and derivation of relations between torsional moment, shear stress and angle of twist.	3	1	
Torsion in thin walled hollow section, closely coiled helical springs.	2	1	

References			
Name of Book	Name of Author	Name of Publisher	Edition
Strength of Materials	S. Ramamrutham	Dhanpat Rai	
Strength of Materials	Dr. R K Bansal	Laxmi Publication	5 <sup>th</sup>
Strength of Materials	S.P. Timoshenko	Mc. Graw Hill	
Mechanics of Materials	Ferdinand P.Beer, E. Russell Johnston Jr.	Mc. Graw Hill	
Strength Of Materials	F.L. Singer	Haper and Row	
Schaum's outline of Strength of Materials	William A. Nash	Mc. Graw Hill	
Applied Mechanics and Strength of Materials	A. B. Clemens	International text book company 1906	

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**BE - CIVIL ENGINEERING**  
**(CHOICE BASED CREDIT SYSTEM)**

Sem: III (3 <sup>rd</sup> )	Total Hours Distribution per week		
Total Credit : 1	Practical (P): 2 Hrs.		
Subject Code	BECVE303P	SOLID MECHANICS	
Examination Scheme - Practical			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
25 Marks	25 Marks	25 Marks	--

**List of Experiments: (Any Six)**

1. To Study Various Types of Strain Gauge Apparatus
2. To Determine The Tensile Strength of Steel Specimen
3. To Perform Hardness Test on Various Metals. (Brinnell Hardness Test & Dynamic Hardness Test.)
4. To Perform Standard Torsion Test on Metals
5. To Perform The Impact Test on Metal ( Izod/ Charpy)
6. To Determine The Spring Constant of Closely Coiled Spring .
7. To Perform Shear Test on Different Metals
8. To Perform Fatigue Test on Mild Steel Bar.
9. To Perform Bending Test on Wooden Beam And Find Its Flexural Rigidity

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Sem: III (3 <sup>rd</sup> )	Total Hours Distribution per week		
Total Credit: 3	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): NA	Practical (P): 2 Hrs.
Subject Code	BECVE304T	GEOTECHNICAL ENGINEERING	
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

<b>Course Objectives</b>	
<b>1</b>	To impart knowledge about index properties and their determination.
<b>2</b>	Introduce to the students, the principle permeability and seepage in the soil.
<b>3</b>	To impart knowledge about engineering properties and their determination.
<b>4</b>	Familiarize the students with the procedures used for Shallow and Deep foundation.
<b>5</b>	To impart knowledge about Basic Geology.

<b>Course Outcomes</b>	
<b>After completion of syllabus, students would be able to</b>	
<b>1</b>	Find the index and engineering properties of the soil.
<b>2</b>	Determine properties & demonstrate interaction between water and soil.
<b>3</b>	Analyze and compute principles of compaction and consolidation settlements of soil.
<b>4</b>	Ability to analyze to calculate bearing capacity, earth pressure and foundation settlement.
<b>5</b>	Study and identify different type's natural materials like rocks & minerals and soil.



## MAPPING OF CO WITH PO

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	2	2	1	--	--	2	2
CO2	3	2	1	2	--	--	2	1	--	1	--	2
CO3	3	2	2	2	1	2	--	1	--	2	--	2
CO4	3	2	1	1	1	2	2	1	--	2	--	2
CO5	3	2	2	2	2	--	--	1	--	--	2	2

1 Low

2 Medium

3 High



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**(CHOICE BASED CREDIT SYSTEM)**  
**BECVE304T- GEOTECHNICAL ENGINEERING**  
**SYLLABUS**

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
<b>UNIT NO.1 (INTRODUCTION AND PHASES OF SOIL)</b>			
Formation of soil, residual & transported soil, major deposits found in India.	1		1
Soils generally used in practice such as sand, gravel, organic soil, clay, Betonies, black cotton soil etc.	1		1
Various soil weight & volume inter-relationship.	1		1
Index Properties & Their Determination, Water content, specific gravity, sieve analysis, particle size distribution curve, sedimentation analysis.	2		1
Consistency of soil, Atterberge's limits.	2		1
Classification of Soil: Particle size classification, Textual classification, Unified & I.S. classification system.	2		1
<b>UNIT NO.2 (PERMEABILITY, SEEPAGE &amp; STRESS DISTRIBUTION)</b>			
Darcy's law & its validity, Discharge & seepage velocity, factors affecting permeability.	1		2
Determination of coefficients of permeability by Laboratory and field methods.	1		2
Permeability of stratified soil. insitu permeability test.	1		2
Seepage pressure, quick sand condition, characteristics & uses of flownets.	1		2
Preliminary problems of discharge estimation in homogeneous soils, Effective, Neutral and total stresses in soil mass. Piping, filter criteria.	1		2



<b>UNIT NO.3 (CONSOLIDATION &amp; COMPACTION)</b>			
Compression of laterally confined soil, Terzaghis 1-D consolidation theory (formation of Differential equation).	1		3
Determination of coefficient of consolidation, Degree of consolidation.	1		3
Determination of preconsolidation pressure, Settlement, Rate of settlement.	1		3
Compaction: Mechanism of compaction, factors affecting compaction.	1		3
Standard & modified proctor Tests, field compaction equipments, quality control.	1		3
Advance compaction Techniques, Nuclear density meter.	1		3
Shear Strength: Introduction, Mohr Coulombs theory, Drainage condition.	1		3
Measurement of shear strength by direct shear test, triaxial test, unconfined compression test.	1		3
Vane shear test, sensitivity. shear strength of clays and sands.	1		3
<b>UNIT NO.4(SHALLOW &amp; DEEP FOUNDATION)</b>			
Bearing capacity of soil: Factor affecting bearing capacity, Terzaghis theory.	1		4
Its validity and limitation, types of shear failure in foundation soil.	1		4
Effect of water table on bearing capacity, Settlement of shallow foundation.	1		4
Classification of piles, constructional features of cast- in – situ & pre cast concrete piles.	1		4
Pile driving methods, effect of pile driving on ground.	1		4
Pile capacity by static formula & dynamic formulae spacing of piles in group, negative skin friction and its effect on pile capacity.	1		4
<b>UNIT NO.5 (PHYSICAL GEOLOGY)</b>			
Introduction and scope of Geology and subdivision ,Internal structure of the earth, Weathering, erosion and denudations process on earth material and natural agencies	1		5



Geological work of wind, river underground water and glaciers.	1		5
Earthquakes: Basics of earthquake, earthquake history, seismic activity, concept of intensity and magnitude of earthquake, causes of earthquake	1		5
Influence on civil structures and engineering consideration, seismic zonation, Stratigraphy of INDIA-Introduction.	1		5

References							
Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
1,2,3,4,5,	Soil Mechanics & Foundation Engg	B.C.Punmia	Laxmi Publication		Yes		
1,2,3,4,	Soil Mechanics & Foundation Engg	K.R. Arora	Std. Publisher		Yes		
1,2,3,4,	Soil Mechanics & Foundation Engg	Modi	Std. Publisher				Yes
1,2,3,4,	Soil Mechanics & Foundation Engg	V.N.S.Murthy	CBS Publisher				Yes
5	Geology for Engineers		FGH Blyth		Yes		
5	Basic Geotechnical Earthquake Engineering	Kamalesh Kumar			Yes		



List of Code/Handbook			
Applicable for Unit No.	Title of Code	Type of code	Year of Publication
2,5	Geotechnical Handbook by B.M.Das		2011
2	Methods of test for soils, IS : 2720 (Part VII-1980)	Indian Standard	AUGUST 1997
3	Methods of test for soils, Laboratory determination of Permeability, IS 2720-PART-17-1986).	Indian Standard	Reaffirmed 2002
2	I.S. 2720 (Part-29) : 1975 (Reaffirmed 1988) core cutter method. I.S. 2720 (Part 28) : 1974 (Reaffirmed 1988) Sand replacement method.	Indian Standard	Reaffirmed 1995
4	Methods of test for soils, Direct shear test, I.S. 2720 (Part-XIII) 1965.	Indian Standard	Reaffirmed 2002
5	Methods of test for soils, Proctor Test, I.S. 2720 (Part-VIII) – 1965	Indian Standard	SEPTEMBER 1994

Applicable for Unit No.	Website address
1	<a href="https://www.geoengineer.org/education/soil-mechanics">https://www.geoengineer.org/education/soil-mechanics</a>
1	<a href="http://civilengineering-notes.weebly.com">http://civilengineering-notes.weebly.com</a>
2	<a href="https://www.geoengineer.org/education/soil-mechanics">https://www.geoengineer.org/education/soil-mechanics</a>
2	<a href="https://nptel.ac.in">https://nptel.ac.in</a>
3	<a href="https://www.slideshare.net/prasadprabhu50/chapter-3-compaction-and-consolidation">https://www.slideshare.net/prasadprabhu50/chapter-3-compaction-and-consolidation</a>
4	<a href="https://nptel.ac.in/content/storage2/courses/105101083/download/lec17.pdf">https://nptel.ac.in/content/storage2/courses/105101083/download/lec17.pdf</a>
4	<a href="https://www.slideshare.net/jagrutib22/all-about-deep-foundations">https://www.slideshare.net/jagrutib22/all-about-deep-foundations</a>
5	<a href="https://sites.google.com/site/3rdsemnotes/engineering-geology">https://sites.google.com/site/3rdsemnotes/engineering-geology</a>

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Sem: III (3 <sup>rd</sup> )	Total Hours Distribution per week		
Total Credit : 1	Practical (P): 2 Hrs.		
Subject Code	BECVE304P	GEOTECHNICAL ENGINEERING	
Examination Scheme - Practical			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
25 Marks	25 Marks	25 Marks	--

**List of Experiments :**

**A. Any 10**

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.

**B. One field visit or one case study included in journal.**

**C. Use of plasticity Chart or Newmarks Chart.**

1. Ashingorey  
A.M. SHINGAREY

2. Shir  
(Rohit S. Mane)

3. Shinde  
(Dr. A.M. Pande)

4. Ashchde  
Dr. A.M. Shchde

5. Shinde  
Dr. Lushar G. Shonde

6. Ashchde  
(Dr. A.N. Salhade)

7. Shinde  
(Dr. A.N. Shrikhande)  
Chairman, BOS (Civil)



**Course Outcomes: After completion of syllabus, students would be able to**

<b>Cos</b>	<b>Description</b>
CO1	Analyze the fundamental principles of soil mechanics and geotechnical engineering associated with the analysis and design of geotechnical structures.
CO2	Utilize and compute mathematical, analytical and numerical methods to analyze geotechnical engineering problems.
CO3	Determine the Index properties of soils.
CO4	Classification of soils.
CO5	Determination of Engineering Properties of soils.

**Mapping of Course Outcomes with Program Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	3	2	2	1	--	--	--	2	--	--	--	1
<b>CO2</b>	3	1	1	1	--	--	--	2	--	--	--	1
<b>CO3</b>	3	2	2	2	--	--	1	1	--	--	--	2
<b>CO4</b>	3	1	1	1	1	2	2	1	1	1	--	2
<b>CO5</b>	3	1	1	2	1	1	1	1	2	2	--	2



**RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR**  
**FACULTY OF SCIENCE & TECHNOLOGY**  
**BE CIVIL ENGINEERING**  
**(CHOICE BASED CREDIT SYSTEM)**

Sem: III (3 <sup>rd</sup> )	Total Hours Distribution per week		
Total Credit: 2	Lecture (L): 3Hrs	Tutorial/Activity (T/A): NA	Practical (P): 1 Hr.
Subject Code	BECVE 305 T	BUILDING CONSTRUCTION & ELEMENTARY BUILDING DRAWING	
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

<b>Course Objectives</b>	
<b>1</b>	To prepare the students to understand components of buildings and their functions.
<b>2</b>	To prepare students to understand execution of various constructions activities and material.
<b>3</b>	To prepare students to analyse behaviour of structure under different environmental conditions.
<b>4</b>	To prepare students to identify & suggest rectification the various defects in civil engineering works.

<b>Course Outcomes</b>	
<b>After completion of syllabus, students would be able to</b>	
<b>1</b>	Identify components of a building.
<b>2</b>	Differentiate and identify types of building materials.
<b>3.</b>	Select appropriate material for building construction.
<b>4.</b>	Plan various construction related activities and their quality control.
<b>5.</b>	Know & identify the latest techniques and materials used.



## MAPPING OF CO WITH PO

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

1 Low

2 Medium

3 High



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BE - CIVIL ENGINEERING**

**(CHOICE BASED CREDIT SYSTEM)**

**BECVE305T - BUILDING CONSTRUCTION &  
ELEMENTARY BUILDING DRAWING  
SYLLABUS**

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
<b>UNIT NO.1 (FOUNDATIONS)</b>			
Foundations: Necessity and types of R.C.C. foundations, Detail of Deep foundation and precast foundation in general, Details shallow foundations.	3		4
Bearing capacity of soils and its assessment. Preumptive bearing capacity values from codes. Loads on foundations. Causes of failures of foundations and remedial measures,	2		4
Foundation on black cotton soils Setting out foundation trenches, excavation timbering of foundation trenches. Load bearing and framed structures.	2		4
	7		
<b>UNIT NO.2 (BRICKWORK AND STONE WORK)</b>			
Qualities of good bricks, classification of bricks, Terms used in brickwork, commonly used types of bonds in brickwork such as header, stretcher, English and Flemish bonds, principles of construction. Reinforced brickwork.	2		2
Parapets, copings, sills and corbels, brief introduction to cavity walls, load bearing and partition walls. Masonry construction using cement concrete blocks and clay blocks, load bearing and partition walls. Precast construction : Introduction to method and materials. Precast elements likes poles, cover, jallies, steps corbels, truss element etc.	2		3
Selection of stones types of stone masonry, principles of construction joints in masonry. Lifting heavy stones, common building stones in India.	2		2
Arches and Lintels : Terminology in contraction, types chajjas and canopies, pre cast Lintels & Arches.	2		3
	8		



<b>UNIT NO.3 (DPC, FLOORS AND ROOFS )</b>			
Damp Proofing : Causes and effect of dampness. Various methods of damp proofing Damp proofing in plinth protection, New Techniques of Damp Proofing Damp Proofing in Plinth Protection, New Techniques of Damp proofing. Epoxy etc.	3		3
<b>Floors</b> : General principals, types and method of construction, floors finished quality, testing floor tiles, synthetic & Ceramic Tiles.	2		1
<b>Roofs</b> : Flat and pitches roofs, roof coverings, types AND their constructional features. Thermal Insulation	2		5
	7		
<b>UNIT NO.4 (STAIRS, DOORS AND WINDOWS)</b>			
<b>Stairs</b> : Types of stairs, functional design of stairs.	3		4
<b>Doors and Windows</b> : Purpose materials of construction and types.	4		4
	7		
<b>UNIT NO.5 (PLASTERING AND POINTING, PAINTING)</b>			
Plastering and Pointing : Necessity, types and methods	2		2
Temporary Timbering : Centering and formwork shoring, underpinning and scaffolding.	3		2
Painting : White washing, colour washing and distempering new materials & Techniques.	2		2
	7		



References							
Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
1 to 5	Building Construction	by Rangwala	Charotar Pub. House				yes
1 to 5	Building Construction & Construction Materials	G. S. Birde & T. D. Ahuja	Dhanpat Rai Pub. company		yes		
1 to 5	Building Construction	Arun kr. Jain Ashok kr. Jain B. C. Punmia	Laxmi	11th			yes
1 to 5	Building Construction	Gurucharan singh	Standard Book House		yes		

1. A. M. Shingarey  
A. M. SHINGAREY

2. Rohit S. Mane  
(Rohit S. Mane)

3. A. M. Pande  
(Dr. A. M. Pande)

4. Dr. A. M. Shende  
Dr. A. M. Shende

5. Dr. Tushar G. Shende  
Dr. Tushar G. Shende

6. Dr. A. N. Sakhade  
(Dr. A. N. Sakhade)

7. Dr. A. N. Shrikhande  
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BE - CIVIL ENGINEERING**

**(CHOICE BASED CREDIT SYSTEM)**

Sem: III (3 <sup>rd</sup> )	Total Hours Distribution per week		
Total Credit : 1	Practical (P): 2 Hrs.		
Subject Code	BECVE303P	BUILDING CONSTRUCTION & ELEMENTARY BUILDING DRAWING	
Examination Scheme - Practical			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
25 Marks	25 Marks	25 Marks	--

**List of Experiments:**

1. Development of a given line plan of a residential building.  
Draw to a scale of 1: 50
  1. Detailed Plan.
  2. Elevation.
  3. Section.
2. Following Sketches pertaining to the above plan (with Standard Dimensions)
  - a. Door- Panelled door
  - b. Window
  - c. Stair
  - d. Masonry
  - e. Lintel
3. Students should prepare working drawing of Foundation Plan (on tracing paper) for the above Residential Building Plan. It should contain detailed foundation plan with foundation details. (Use suitable scale 1:50 or 1:100)
4. Draw sketches using computer software of the following:
  1. Foundations- two plates
    - a) Line sketches of shallow and deep footing.
    - b) Details of any one of the shallow footings.
  2. Arches- two plates.



- a) Different types of arches
- b) Details of arch showing different components
3. Trusses- one plate. (Showing different components)

5. One seminar report and presentation based on various aspects of Modern materials and construction methods.

6. Site visit and technical report on the visit (Minimum Two).

(Visit should contain Stage of visit, related sketches of components-C/S-Dimensions, Materials used ,site plan sketch and detailed report etc.) Visit to a construction related exhibition is strongly recommended.

7. Collection of advertisements of modern construction materials and Tools used in construction.

8. Indoor dimension: Height of kitchen platform, bathroom fittings positioning details, furniture details etc.

Note: Collection of local byelaws details from the surrounding areas, Building plan according to byelaws. Carrying a 5m tape is compulsory to all.

List of Code/Handbook			
Applicable for Unit No.	Title of Code	Type of code	Year of Publication
1 to 5	Building Construction Handbook by R. Chudley, Roger Greeno		Jun 2021
1 to 5	Building Construction Handbook by Sanjeev Mathur		Jun 2021
1 to 5	Practical Handbook on Building Construction by Er. M. K. Gupta		2019
1 to 5	National Building Code of India		Jan 2014
1 to 5	IS-4031, 650, 383, 2387,		

1. Ashingorey  
A.M. SHINGAREY

2. Rohit S. Mane  
(Rohit S. Mane)

3. Alonde  
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4. Dr. A.M. Shende  
Dr. A.M. Shende

5. Dr. Tushar G. Shende  
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6. Dr. A.N. Dashede  
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**(CHOICE BASED CREDIT SYSTEM)**

Sem: III (3 <sup>rd</sup> )	Total Hours Distribution per week		
Total Credit: 2	Lecture (L): 2Hrs	Tutorial/Activity (T/A): N.A	Practical (P): N.A
Subject Code	BECVE306T	EFFECTIVE TECHNICAL COMMUNICATION	
Examination Scheme			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
15 Marks (07 marks for sessional Examination) (08 Marks for Activity based)	35 Marks	23 Marks	2 Hours

<b>Course Objectives</b>	
<b>1</b>	To enhance competency in English language among learners aspiring to be entrepreneurs/higher learning.

<b>Course Outcomes</b>	
<b>After completion of syllabus, students would be able to</b>	
<b>1</b>	To face competitive examinations (IELTES/ TOEFL/CAT/ MAT/ XAT/SNAP/GMAT/GATE etc.)
<b>2</b>	To pursue masters degree. They will also acquire language skills required to write their Reviews/Projects/Reports.
<b>3.</b>	To organize their thoughts in English and hence face job interviews more confidently.



## MAPPING OF CO WITH PO

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

1 Low

2 Medium

3 High



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**BE CIVIL ENGINEERING**  
**(CHOICE BASED CREDIT SYSTEM)**  
**BECVE306T- EFFECTIVE TECHNICAL**  
**COMMUNICATION**  
**SYLLABUS**

Details of Topic	Allotment of Hours		Mapped with CO Number CO
	L	T/A	
<b>UNIT NO.1 : Functional Grammar</b>	6		
Common errors, Transformation of Sentences, Phrases, Idioms & Proverbs.  [50 sentences of common errors, 50 examples of Transformation of Sentences, (5 each type), 50 noun/prepositional phrases, 50 idioms/proverbs]			
<b>UNIT NO.2: English for Competitive Exams &amp; Interview Techniques:</b>	6		
IPA (vowel & consonant phonemes), Word building (English words /phrases derived from other languages), Technical Jargons, Synonyms/Antonyms, Analogies, Give one word for, Types & Techniques of Interview  Assignment : [ 25 Words for teaching IPA, 25 words/phrases of foreign origin, 25 technical jargons, 25 words for Synonyms/ Antonyms, 25 words for Analogies, 50 examples of give one word for]			
<b>UNIT NO.3 Formal Correspondence</b>	6		
Business Letters, e-mail etiquettes [Orders, Complaints, Enquiries, Job applications and Resume Writing, Writing Memorandum, Circulars, notices]			
<b>UNIT NO.4 Analytical comprehension</b>	4		
Four fictional & four non-fictional unseen texts			



<b>UNIT NO.5 Technical &amp; Scientific Writing:</b>	<b>6</b>		
Features of Technical Writing, Writing Scientific Projects, Technical Report writing, Writing Manuals, Writing Project Proposals, Writing Research papers. Assignment: (Any one project/review as assignment)			

Reference Books:

1. Effective technical Communication by Barun K. Mitra, Oxford University Press,
2. Technical Communication- Principles and Practice by Meenakshi Raman & Sharma, Oxford University Press, 2011, ISBN-13-978-0-19-806529-
3. The Cambridge Encyclopedia of the English Language by David Crystal, Cambridge University Press
4. Contemporary Business Communication by Scot Ober, Published by Biztantra,
5. BCOM-A South-Asian Perspective by C. Lehman, D. DuFrene & M. Sinha, Cengage Learning Pvt. Ltd. 2012
6. Business English, by Dept of English, University of Delhi, Published by Dorling Kindersley (India), Pvt Ltd., 2009, ISBN 978 81 317 20776
7. How to Prepare a Research Proposal: Guidelines for Funding and Dissertations in the Social and Behavioral Sciences by Krathwohl & R David
8. Technical Writing- Process and Product by Sharon J. Gerson & Steven M. Gerson, 3rd edition, Pearson Education Asia, 2000
9. Developing Communication skills by Krishna Mohan & Meera Banerjee

1. A. M. Shingarey  
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5. Tushar G. Shende  
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6. Dr. A.N. Balhade  
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