



(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C.Nagar, K.Vellakulam - 625 701, (Near Virudhunagar), Madurai District.

## **B.E. CIVIL ENGINEERING**

**Regulation - 2020**

### **AUTONOMOUS SYLLABUS**

### **CHOICE BASED CREDIT SYSTEM (CBCS)**

### **CURRICULUM AND SYLLABI**

**(III & IV)**

#### **VISION**

To make the Department of Civil Engineering, unique of its kind to promote education and research in the various fields of construction industry.

#### **MISSION**

To impart highly innovative and technical knowledge in the field of Civil Engineering to the urban and rural student folks through “Total Quality Education”.

#### **PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

##### **PEO 1:**

Graduates of the program will be creative, able to apply scientific knowledge and computer aided design tools for technical problems in the field of Civil Engineering.

##### **PEO 2:**

Graduates of the program will be a professional Civil Engineer and/or will pursue higher education in various domains of Civil Engineering by taking competitive examinations.

##### **PEO 3:**

Graduates of the program will passionately perform as a competent team member, team leader and/or entrepreneur in the development of a sustainable environment.

**PROGRAM OUTCOMES:**

After going through the four years of study, the Civil Engineering graduates will have the ability to

	<b>Graduate Attribute</b>	<b>Programme Outcome</b>
1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **PROGRAMME SPECIFIC OUTCOMES (PSOs):**

#### **PSO1 :**

Graduating students will be able to deal complex problems in the field of Civil Engineering to achieve design solutions with modern technological approach and application software.

#### **PSO2:**

Graduating students will be able to understand the professional Civil Engineering practice and apply contextual knowledge with the appropriate consideration of the society and environment.



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**AUTONOMOUS SYLLABUS**

**CHOICE BASED CREDIT SYSTEM (CBCS)**

**CURRICULUM AND SYLLABI**

**(III TO IV)**

**SEMESTER III**

Sl. No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	MA1373	Transforms and Partial Differential Equations	BS	4	3	1	0	4
2.	CE1301	Construction Materials	PC	3	3	0	0	3
3.	CE1302	Engineering Geology	PC	3	3	0	0	3
4.	CE1303	Fluid Mechanics	PC	3	3	0	0	3
5.	CE1304	Strength of Materials I	PC	3	3	0	0	3
6.	CE1305	Surveying	PC	3	3	0	0	3
<b>PRACTICAL</b>								
7.	CE1311	Computer Aided Building Drawing Laboratory	PC	4	0	0	4	2
8.	CE1312	Surveying Laboratory	PC	4	0	0	4	2
9.	HS1321	Interpersonal Skills - Listening and Speaking	EEC	2	0	0	2	1
<b>TOTAL</b>				<b>29</b>	<b>18</b>	<b>1</b>	<b>10</b>	<b>24</b>

### SEMESTER IV

SI. No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1.	MA1471	Numerical Methods	BS	4	3	1	0	4
2.	CE1401	Applied Hydraulic Engineering	PC	3	3	0	0	3
3.	CE1402	Concrete Technology	PC	3	3	0	0	3
4.	CE1403	Construction techniques, Equipment and Practice	PC	3	3	0	0	3
5.	CE1404	Soil Mechanics (Theory cum Lab)	PC	5	3	0	2	4
6.	CE1405	Strength of Materials II	PC	3	3	0	0	3
<b>PRACTICAL</b>								
7.	CE1411	Strength of Materials Laboratory	PC	4	0	0	4	2
8.	HS1421	An Introduction to Advanced Reading and Writing	EEC	2	0	0	2	1
<b>TOTAL</b>				<b>30</b>	<b>21</b>	<b>1</b>	<b>8</b>	<b>23</b>

## SEMESTER III

### MA1373 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

L	T	P	C
3	1	0	4

#### OBJECTIVES

This course enables the students to

- To introduce the basic concepts of PDE used in solving partial differential Equations.
- To introduce Fourier series which plays a vital role in solving boundary value problems.
- To acquaint the students with Fourier transform and Z-transform techniques

#### UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Lagrange's Linear equation – Solution of linear equations of higher order with constant coefficients – Linear non-homogeneous partial differential equations.

#### UNIT II FOURIER SERIES 12

Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and cosine series – Complex form of Fourier series – Parseval's identity – Harmonic Analysis.

#### UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION 12

Classification of partial differential equations- Method of separation of variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two- dimensional heat equation – Fourier series solutions in cartesian coordinates.

#### UNIT IV FOURIER TRANSFORM 12

Fourier integral theorem – Fourier transform pair - Sine and cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

#### UNIT V Z – TRANSFORM AND DIFFERENCE EQUATIONS 12

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and final value theorems – Formation of difference equation – Solution of difference equation using Z - transform.

**TOTAL: 60 PERIODS**

## **COURSE OUTCOMES:**

At the end of the course, students will be able to

- CO1 Form the partial differential equations and solve them using various techniques
- CO2 Find the Fourier constants and frame the Fourier series of periodic functions
- CO3 Classify and solve the initial and boundary value problems such as wave and heat flow equation
- CO4 Compute the Fourier transforms of standard functions and learn the properties
- CO5 Apply the techniques of Z- transform to get the solutions of differential equations

## **TEXTBOOKS:**

- 1 Erwin kreyszig, 2015, *Advanced Engineering Mathematics*, John Wiley & Sons, 10th Edition, New Delhi.
- 2 Grewal B,S, 2017, *Higher Engineering Mathematics*, Khanna Publishers, 44th Edition, New Delhi.

## **REFERENCES:**

- 1 Bali, N, Goyal, M, & Watkins C, 2009, *Advanced Engineering Mathematics*, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), 7th Edition, New Delhi.
- 2 Narayanan, S, Manicavachagom Pillay T, K & Ramanaiah, G , 1998, *Advanced Mathematics for Engineering Students*, Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai.
- 3 Glyn James, 2011, *Advanced Modern Engineering Mathematics*, Pearson Education, 4 th Edition, New Delhi.
- 4 Peter V, O'Neil, 2012, *Advanced Engineering Mathematics*, Cengage Learning India Pvt., Ltd, 7 th Edition, New Delhi.
- 5 Ramana, 2010, B,V, *Higher Engineering Mathematics*, Tata McGraw Hill, 11th Reprint, New Delhi.

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To introduce students to various materials commonly used in civil engineering construction and their properties

**UNIT I STONES – BRICKS – CONCRETE BLOCKS****9**

Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Compressive Strength – Water Absorption – Efflorescence – Bricks for special use – Refractory bricks – Concrete blocks – Lightweight concrete blocks – Flyash Bricks.

**UNIT II LIME – CEMENT – AGGREGATES – MORTAR****9**

Lime – Preparation of lime mortar – Cement – Ingredients – Manufacturing process – Types and Grades – Properties of cement and Cement mortar – Hydration – Compressive strength – Tensile strength – Fineness– Soundness and consistency – Setting time – fine aggregates – river sand – crushed stone sand – properties – coarse Aggregates – Crushing strength – Impact strength – Flakiness Index – Elongation Index – Abrasion Resistance – Grading-Bulking of fine aggregate – M-Sand.

**UNIT III CONCRETE****9**

Concrete – Ingredients – Manufacturing Process – Batching plants –mixing – transporting – placing – compaction of concrete –curing and finishing – Ready mix Concrete – Mix specification – Special Concrete.

**UNIT IV TIMBER AND OTHER MATERIALS****9**

Timber – Market forms – Industrial timber– Plywood – Veneer – Thermocol – Panels of laminates – Steel – Aluminum and Other Metallic Materials – Composition – Aluminum composite panel – Market forms – Mechanical treatment – Paints – Varnishes – Distempers – Bitumen.

**UNIT V MODERN MATERIALS****9**

Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products –

Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles– Geomembranes and Geotextiles for earth reinforcement.- Green material, Sustainable material, Nano materials, Construction chemicals, Pavement Tiles – Interlocking concept.

**TOTAL: 45 PERIODS**

### **COURSE OUTCOMES**

Upon successful completion of course the students will be able to

- CO1 Compare the properties of most common and advanced building materials
- CO2 summarize the typical and potential applications of lime, cement and aggregates.
- CO3 outline the production of concrete and also the method of placing and making of concrete elements.
- CO4 Illustrate the applications of timbers and other materials.
- CO5 Illustrate the importance of modern material for construction

### **TEXT BOOKS:**

1. Varghese.P.C, 2015, *Building Materials*, PHI Learning Pvt. Ltd, New Delhi.
2. Rajput. R.K., 2008, *Engineering Materials*, S. Chand and Company Ltd.
3. Gambhir.M.L., 2004, *Concrete Technology*, 3rd Edition, Tata McGraw Hill Education
4. Duggal.S.K., 2008, *Building Materials*, 4th Edition, New Age International.

### **REFERENCES:**

1. Jagadish.K.S,2007, *Alternative Building Materials Technology*, New Age International.
2. Gambhir. M.L., &NehaJamwal 2012,*Building Materials, products, properties and systems*, Tata McGraw Hill Educations Pvt. Ltd, New Delhi,.
3. *IS456 - 2000: Indian Standard specification for plain and reinforced concrete*, 2011.
4. *IS4926 - 2003: Indian Standard specification for ready-mixed concrete*, 2012.
5. *IS383 - 1970: Indian Standard specification for coarse and fine aggregate from natural Sources for concrete*, 2011.
6. *IS1542-1992: Indian standard specification for sand for plaster*, 2009.
7. *IS 10262-2009: Indian Standard Concrete Mix Proportioning –Guidelines*, 2009.



geological investigations and mining - Coastal protection structures. Investigation of Landslides, causes and mitigation.-Case Studies in India

**TOTAL: 45 PERIODS**

### **COURSE OUTCOMES**

Upon successful completion of course the students will be able to

- CO1 Develop an understanding about the various physical processes that lead to the formation of geological features and plate tectonics.
- CO2 Identify and categorize minerals based on their appearance and chemical composition
- CO3 Compare the traits that delineate the various types of rocks and their suitability for various engineering applications
- CO4 Relate the structural form of rocks and its implications on its mechanical properties
- CO5 Make use of various field investigation techniques like remote sensing for collecting data on geological conditions on site.

### **TEXT BOOKS:**

1. Varghese, P.C.,2012, *Engineering Geology for Civil Engineering*, Prentice Hall of India Learning Private Limited, New Delhi.
2. Venkat Reddy. D, 2010, *Engineering Geology*, Vikas Publishing House Pvt. Ltd.
3. Gokhale KVGK,2011, *Principles of Engineering Geology*, B.S. Publications, Hyderabad.
4. ChennaKesavulu N.,2009, *Textbook of Engineering Geology*, Macmillan India Ltd.
5. Parbin Singh. A ,2009,*Textbook of Engineering and General Geology*, Katson publishing house, Ludhiana.

### **REFERENCES:**

1. Blyth F.G.H. & De Freitas M.H., 2010, *Geology for Engineers*, Edward Arnold, London.
2. Bell .F.G., 2011, *Fundamentals of Engineering Geology*, B.S. Publications. Hyderabad.
3. Dobrin, M.B, 1988 ,*An introduction to geophysical prospecting*, McGraw Hill, New Delhi,.

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To understand the basic properties of the fluid, fluid kinematics, fluid dynamics and to analyze and appreciate the complexities involved in solving the fluid flow problems.

**UNIT I FLUID PROPERTIES AND FLUID STATICS****9**

Fluid – definition, distinction between solid and fluid - Units and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, capillarity and surface tension - Fluid statics: concept of fluid static pressure, absolute and gauge pressures - pressure measurements by manometers-forces on planes – centre of pressure – buoyancy and floatation.

**UNIT II FLUID KINEMATICS AND DYNAMICS****9**

Fluid Kinematics – Classification and types of flow - velocity field and acceleration - continuity equation (one and three dimensional differential forms)- stream line-streak line-path line- stream function - velocity potential function - flow net. Fluid dynamics - equations of motion -Euler's equation along streamline - Bernoulli's equation – applications - Venturimeter, orifice meter and Pitot tube- linear momentum equation and its application to pipe bend.

**UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES****9**

Fundamental dimensions - dimensional homogeneity - Rayleigh's method and Buckingham Pi-theorem - dimensionless parameters - similitude and model studies - distorted models.

**UNIT IV FLOW THROUGH PIPES****9**

Reynold's experiment - laminar flow through circular pipe (Hagen poiseulle's) - hydraulic and energy gradient – flow through pipes - Darcy - Weisbach's equation - pipe roughness -friction factor- Moody's diagram- major and minor losses of flow in pipes - pipes in series and in parallel – Equivalent pipe.

**UNIT V BOUNDARY LAYER****9**

Boundary layer – definition- boundary layer on a flat plate – laminar and turbulent boundary layer- displacement, energy and momentum thickness – Momentum integral equation-Boundary layer separation and control – drag on flat plate.

**COURSE OUTCOMES:**

Upon successful completion of course the students will be able to

- CO1 Get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
- CO2 Understand and solve the problems related to equation of motion.
- CO3 Gain knowledge about dimensional and model analysis.
- CO4 Learn types of flow and losses of flow in pipes.
- CO5 Understand and solve the boundary layer problems.

**TEXT BOOKS:**

1. Modi P.N and Seth., 2009, *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Standard Book House New Delhi.
2. Jain.A.K.,2016,*Fluid Mechanics" (Including Hydraulic Machines)*, Khanna Publishers, Twelfth Edition.
3. Subramanya.K., 2010,*Fluid Mechanics and Hydraulic Machines*, Tata McGraw Hill Education Private Limited, New Delhi.
4. Rajput.R.K., 2008,*Fluid Mechanics*, S.Chand and Co, New Delhi.

**REFERENCES:**

1. Streeter, V.L., and Wylie, E.B., 2010,*Fluid Mechanics*, McGraw Hill.
2. Fox W.R. and McDonald A.T., 2013,*Introduction to Fluid Mechanics*, John-Wiley and Sons, Singapore.
3. White, F.M., 2017,*Fluid Mechanics*, Tata McGraw Hill, 5th Edition, New Delhi.
4. Mohd. Kaleem Khan., 2015, *Fluid Mechanics and Machinery*, Oxford University Press, New Delhi.
5. Bansal.R.K., 2013,*Fluid Mechanics and Hydraulic Machines*, Laxmi Publications Pvt. Ltd., New Delhi.

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To learn the fundamental concepts of Stress, Strain and deformation of solids.
- To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
- To understand the effect of torsion on shafts and springs.
- To analyze plane and space trusses

**UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS****9**

Simple Stresses and strains – Elastic constants - Relationship between elastic constants – Stress Strain Diagram – Ultimate Stress – Yield Stress – Deformation of axially loaded member - Composite Bars - Thermal Stresses – State of Stress in two dimensions – Stresses on inclined planes – Principal Stresses and Principal Planes – Maximum shear stress - Mohr's circle method.

**UNIT II TRANSFER OF LOADS AND STRESSES IN BEAMS****9**

Types of loads, supports, beams – concept of shearing force and bending moment – Relationship between intensity of load, Shear Force and Bending moment - Shear Force and Bending Moment Diagrams for Cantilever, simply supported and overhanging beams with concentrated load, uniformly distributed load, uniformly varying load and concentrated moment. Theory of Simple Bending – Stress Distribution due to bending moment and shearing force - Flitched Beams – Leaf Springs.

**UNIT III DEFLECTION OF BEAMS****9**

Elastic curve – Governing differential equation - Double integration method - Macaulay's method - Area moment method - conjugate beam method for computation of slope and deflection of determinant beams.

**UNIT IV TORSION****9**

Theory of Torsion – Stresses and Deformations in Solid and Hollow Circular Shafts – combined bending moment and torsion of shafts - Power transmitted to shaft – Shaft in series and parallel – Closed and Open Coiled helical springs – springs in series and parallel – Design of buffer

springs.

## **UNIT V ANALYSIS OF TRUSSES**

**9**

Determinate and indeterminate trusses - Analysis of pin jointed plane determinate trusses by method of joints, method of sections and tension coefficient – Analysis of Space trusses by tension coefficient method.

**TOTAL: 45 PERIODS**

### **COURSE OUTCOMES:**

Upon successful completion of the course, students will be able to

- CO1 Understand the fundamental concepts of stress, strain of solids and the stresses in two dimensions
- CO2 Construct shear force and bending moment diagram for determinate beams and understand the concept of simple bending
- CO3 Apply the analytical techniques for computing deflection of members subjected to bending.
- CO4 Solve analytical problems on shafts subjected to torsion and helical springs
- CO5 Solve analytical problems on plane and space trusses

### **TEXTBOOKS:**

1. Rajput.R.K., 2015, *Strength of Materials*, S.Chand and Co, New Delhi.
2. Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain., 2015 *SMTS –I Strength of materials*, Laxmi publications. New Delhi,
3. Rattan. S. S., 2012, *Strength of Materials*, Tata McGraw Hill Education Private Limited, New Delhi,
4. Bansal. R.K., 2010, *Strength of Materials*, Laxmi Publications Pvt. Ltd., New Delhi.

### **REFERENCES :**

1. Timoshenko.S.B. and Gere.J.M., 1999, *Mechanics of Materials*, Van Nos Reinhold, New Delhi.
2. Vazirani.V.N and Ratwani.M.M., 1995, *Analysis of Structures*, Vol I Khanna Publishers, New Delhi,.
3. Junnarkar.S.B. and Shah.H.J., 2016, *Mechanics of Structures*, Vol I, Charotar Publishing House, New Delhi.
4. Singh. D.K., 2016, *Strength of Materials*, Ane Books Pvt. Ltd., New Delhi,

5. Basavarajaiah, B.S. and Mahadevappa, P., 2010, *Strength of Materials*, Universities Press, Hyderabad,.
6. Gambhir. M.L., 2009, *Fundamentals of Solid Mechanics*, PHI Learning Private Limited., New Delhi.

**CE1305**

**SURVEYING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To introduce the concepts of plane and geodetic surveying principles
- To illustrate the various methods of surveying to solve the field problems
- To .categorize the errors and correction in surveying
- To outline the basics of Astronomical Surveying.

**UNIT I FUNDAMENTALS OF CONVENTIONAL SURVEYING AND LEVELLING 9**

Classifications and basic principles of surveying - Equipment and accessories for ranging and chaining - Methods of ranging - Compass - Types of Compass - Basic Principles- Bearing – Types - True Bearing - Magnetic Bearing - Levelling- Principles and theory of Levelling – Datum- - Bench Marks – Temporary and Permanent Adjustments- Methods of Levelling- Booking – Reduction - Sources of errors in Levelling - Curvature and refraction.

**UNIT II THEODOLITE AND TACHEOMETRIC SURVEYING 9**

Horizontal and vertical angle measurements - Temporary and permanent adjustments - Heights and distances - Tacheometer - Stadia Constants - Analytic Lens -Tangential and Stadia Tacheometry surveying - Contour – Contouring – Characteristics of contours – Methods of contouring – Tacheometric contouring - Contour gradient – Uses of contour plan and map

**UNIT III CONTROL SURVEYING AND ADJUSTMENT 9**

Horizontal and vertical control- Methods – Triangulation - Traversing – Trigonometric Levelling - Gale's table - Trilateration - Concepts of measurements and errors – error propagation and linearization – adjustment methods – least square methods – adjustment of simple triangulation networks.

#### **UNIT IV MODERN SURVEYING**

**9**

Total Station: Digital Theodolite, EDM, Electronic field book - Advantages – Parts and accessories - working principle – Observables – Errors - COGO functions – Field procedure and applications. GPS: Advantages - System components – Signal structure – Selective availability and antispoofing – receiver components and antenna – Planning and data acquisition – Data processing - Errors in GPS – Field procedure and applications.

#### **UNIT V ADVANCED TOPICS IN SURVEYING**

**9**

Route Surveying - Reconnaissance - Route surveys for highways, railways and waterways - Simple curves – Compound and reverse curves – Transition curves - Setting out different methods of simple curve - Vertical curves - Hydrographic surveying – Tides - MSL - Sounding methods - - Astronomical terms and definitions - Celestial coordinate systems – different time systems - Field observations and determination of azimuth by altitude and hour angle method.

**TOTAL: 45 PERIODS**

#### **COURSE OUTCOMES**

Upon successful completion of the course, students will be able to

- CO1 Understand the rudiments of various surveying and its principles.
- CO2 Infer the concepts of Theodolite and Tacheometric Surveying.
- CO3 Narrate the procedure for establishing horizontal and vertical control and its adjustment procedure.
- CO4 Describe the basics of Modern Surveying
- CO5 Outline the knowledge in Route surveying, Hydrographic surveying and Field Astronomical surveying

#### **TEXTBOOKS:**

1. Venkatramaiah, 2014, “*Text book of Surveying*”, University press, New Delhi,
2. Dr.B.C.Punmia, Ashok K.Jain and Arun K Jain, 2005, “*Surveying Vol.I& II*”, Lakshmi Publications Pvt Ltd, New Delhi.

#### **REFERENCES:**

1. R. Subramanian, 2012, "Surveying and Levelling", Oxford University Press, Second Edition.
2. Bannister and S. Raymond, 2004, "Surveying", Seventh Edition, Longman
3. S.K. Roy, 2004, "Fundamentals of Surveying", Second Edition, Prentice' Hall of India
4. K.R. Arora, 2013, "Surveying Vol I & II", Standard Book house , Twelfth Edition.

**CE1311                      COMPUTER AIDED BUILDING DRAWING  
LABORATORY**

L	T	P	C
0	0	4	2

**OBJECTIVES:**

- To introduce the students to draft the plan, elevation and sectional views of buildings in accordance with development and control rules satisfying orientation and functional requirements as per National Building Code.

**LIST OF EXPERIMENTS**

1. Principles of planning, orientation and complete joinery details (Paneled and Glazed Doors and Windows).
2. Buildings with load bearing walls.
3. Buildings with sloping roof.
4. R.C.C. framed structures.
5. Industrial buildings – North light roof structures.

**TOTAL:60 PERIODS**

**COURSE OUTCOMES:**

Upon successful completion of the course, students will be able to

- CO 1 Draft Paneled and Glazed Doors and Windows.  
 CO 2 Sketch front, top & side views of Buildings with load bearing walls.  
 CO 3 Sketch Buildings with sloping roof.  
 CO 4 Sketch R.C.C. framed structures.  
 CO 5 Draft Industrial buildings – North light roof structures.

**TEXTBOOKS:**

1. SikkaV.B.,*A Course in Civil Engineering Drawing*, 4<sup>th</sup> Edition, S.K.Katariaand Sons, 2015.

- George Omura, *Mastering in Autocad 2005 and Autocad LT 2005*– BPB Publications,2008

**REFERENCES:**

- Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston, *BIM Handbook:A Guide to building information modeling for Owners, Managers, Designers, Engineers, and Contractors*, John Wiley and Sons.Inc.,2011.
- MarimuthuV.M.,Murugesan R. and Padmini S., *Civil Engineering Drawing-I*, Pratheeba Publishers,2008.
- Shah.M.G., Kale. C.M. and Patki.S.Y.,*Building Drawing with an Integrated Approach to Built Environment*, Tata McGraw Hill Publishers Limited,2007.
- Verma.B.P.,*Civil Engineering Drawing and House Planning*, Khanna Publishers,2010.

**CE1312**

**SURVEYING LABORATORY**

L	T	P	C
0	0	4	2

**OBJECTIVE:**

- At the end of the course the student will possess knowledge about Survey field techniques

**LIST OF EXPERIMENTS:**

**Chain Survey**

- Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset
- Setting out works – Foundation marking using tapes single Room and Double Room

**Compass Survey and Plan table Survey**

- Compass Traversing – Measuring Bearings & arriving included angles
- Plan table Surveying – Measuring areas & Distance between inaccessible points

**Levelling - Study of levels and levelling staff**

- Fly levelling using Dumpy level & Tilting level

6. Check levelling

**Theodolite - Study of Theodolite**

- 7. Measurements of horizontal angles by reiteration and repetition and vertical angles
- 8. Determination of elevation of an object using single plane method when base is accessible/inaccessible.

**Tacheometry – Tangential system – Stadia system**

- 9. Determination of Tacheometric Constants
- 10. Heights and distances by stadia Tacheometry
- 11. Heights and distances by Tangential Tacheometry

**Total Station - Study of Total Station, Measuring Horizontal and vertical angles**

- 12. Traverse using Total station and Area of Traverse
- 13. Determination of distance and difference in elevation between two inaccessible points using Total station

**TOTAL: 60 PERIODS**

**COURSE OUTCOMES:**

- CO1 Make use of chain for measuring distance in field
- CO2 Examine the area of traverse and detect local attraction using compass surveying & Plane table Surveying.
- CO3 Examine the elevation of various points and carryout longitudinal and cross sectioning using level
- CO4 Examine the heights and distances using Theodolite and systems of tacheometry.
- CO5 Make use of total station for measuring distance in field

**LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS**

S.No	Description of Equipment	Quantity
1.	Total Station	3 Nos
2.	Theodolites	At least 1 for every 5 students
3.	Dumpy level / Filling level	At least 1 for every 5 students
4.	Pocket stereoscope	1
5.	Ranging rods	1 for a set of 5 students
6.	Levelling staff	

7.	Cross staff	
8.	Chains	
9.	Tapes	
10.	Arrows	
11.	Prismatic Compass	10 nos
12.	Surveyor Compass	2 nos
13.	Survey grade or Hand held GPS	3 nos

### HS1321 INTERPERSONAL SKILLS - LISTENING AND SPEAKING

L	T	P	C
0	0	2	1

#### OBJECTIVES:

The course will enable learners to

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- Improve general and academic listening skills
- Make effective presentations

#### UNIT I LISTENING AS A KEY SKILL

6

Listening as a key skill- its importance- speaking – give personal information – ask for personal information – express ability – enquire about ability – ask for clarification - Improving pronunciation– pronunciation basics — stressing syllables and speaking clearly – intonation patterns – conversation starters: small talk.

#### UNIT II LISTEN TO A PROCESS INFORMATION

6

Listen to a process information- give information, as part of a simple explanation — taking lecture notes – preparing to listen to a lecture – articulate a complete idea as opposed to producing fragmented utterances - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics

**UNIT III      LEXICAL CHUNKING      6**

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk – greet – respond to greetings – describe health and symptoms – invite and offer – accept – decline – take leave – listen for and follow the gist- listen for detail

**UNIT IV      GROUP DISCUSSION      6**

Being an active listener: giving verbal and non-verbal feedback – participating in a group discussion – summarizing academic readings and lectures conversational speech listening to and participating in conversations – persuade- negotiate disagreement in group work.

**UNIT V      GROUP & PAIR PRESENTATIONS      6**

Formal and informal talk – listen to follow and respond to explanations, directions and instructions in academic and business contexts – strategies for presentations and interactive communication – group/pair presentations

**TOTAL: 30 PERIODS**

**COURSE OUTCOMES:**

At the end of the course, students will be able to

- CO1    Develop their communicative competence in English with specific reference to listening
- CO2    Prepare conversation with reasonable accuracy
- CO3    Apply lexical Chunking for accuracy in speaking
- CO4    Demonstrate their ability to communicate effectively in GDs.
- CO5    Explain directions and instructions in academic and business contexts

**TEXT BOOKS:**

1. Brooks, Margret, 2011, *Skills for Success. Listening and Speaking. Level 4*, Oxford University Press, Oxford.
2. Richards, C, Jack& David Bholke, 2010, *Speak Now Level 3*, Oxford University Press, Oxford.

**REFERENCES:**

1. Bhatnagar, Nitin & Mamta Bhatnagar, 2010, *Communicative English for Engineers and Professionals*, Pearson, New Delhi.

2. Hughes, Glyn & Josephine Moate, 2014, *Practical English Classroom*, Oxford University Press, Oxford.
3. Vargo, Mari, 2013, *Speak Now Level 4*, Oxford University Press, Oxford.
4. Richards, C, Jack, 2006, *Person to Person (Starter)*, Oxford University Press, Oxford.
5. Ladousse, Gillian Porter, 2014, *Role Play*. Oxford University Press, Oxford.

**WEB RESOURCES:**

1. <https://www.cambridge.org/elt/blog/wp-content/uploads/2019/10/Learning-Language-in-Chunks.pdf>
2. <https://english.eagetutor.com/english/628-how-to-greet-your-boss-people-in-office.html>
3. <https://www.groupdiscussionideas.com/group-discussion-topics-with-answers/>
4. <https://www.bbc.co.uk/worldservice/learningenglish/business/talkingbusiness/unit3presentations/1opening.shtml>

**SEMESTER IV**

**MA1471**

**NUMERICAL METHODS**

L	T	P	C
3	1	0	4

**OBJECTIVES:**

- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals in real life situations.
- To impart the knowledge of various techniques of differentiation and integration.
- To compute the solution of differential equation with initial and boundary conditions.
- To understand the knowledge of finding the solution for the boundary value problems in Partial differential equations using finite difference methods.

**UNIT I                      SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS                      12**

Solution of algebraic and transcendental equations: Fixed point iteration method – Newton Raphson method – Solution of linear system of equations: Gauss elimination method – Pivoting – Gauss Jordan method – Inverse of a matrix by Jordan Method – Iterative methods of Gauss Jacobi and Gauss Seidel – Dominant Eigen value of a matrix by Power method.



using numerical techniques.. .

CO5 Solve using finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain and one dimensional heat and wave equation.

**TEXTBOOKS:**

1. Burden, R L and Faires, J D 2016, *Numerical Analysis*, 9th Edition, Cengage Learning.
2. Grewal, B S., and Grewal, J S. 2015, *Numerical Methods in Engineering and Science*, Khanna Publishers, 10th Edition, New Delhi.

**REFERENCES:**

1. Brian Bradie, 2007, *A Friendly Introduction to Numerical Analysis*, Pearson Education, Asia, New Delhi.
2. Gerald. C F. and Wheatley P O, 2006, *Applied Numerical Analysis*, Pearson Education, Asia, 6th Edition, New Delhi.
3. Kandasamy, P, Thilagavathy, K, & Gunavathy, K 2014, *Numerical Methods*, 3rd Edition Reprint, S. Chand & Co. Ltd., New Delhi.
4. Mathews, J H, 1992, *Numerical Methods for Mathematics, Science and Engineering*, 2nd Edition, Prentice Hall.
5. Sankara Rao. K. 2007, *Numerical Methods for Scientists and Engineers*, Prentice Hall of India Pvt. Ltd, 3rd Edition, New Delhi.
6. Sastry, S S, 2015, *Introductory Methods of Numerical Analysis*, PHI Learning Pvt. Ltd, 5th Edition, New Delhi

**CE1401**

**APPLIED HYDRAULIC ENGINEERING**

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines.
- At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering.



**TEXTBOOKS:**

1. Subramanya.K .2000,*Flow in open channels*, Tata McGraw Hill, New Delhi.
2. Modi P.N and Seth.S.M .,2009,*Hydraulics and Fluid Mechanics including Hydraulic Machines*, Standard Book House New Delhi.
3. Chandramouli P.N. 2017,*Applied Hydraulic Engineering*, Yes Dee Publishing Pvt. Ltd.

**REFERENCES:**

1. VenTe Chow, 2009, *Open Channel Hydraulics*, McGraw Hill, New York.
2. HanifChaudhry.M., 2007, *Open Channel Flow*, Second Edition, Springer.
3. Rajesh Srivastava,2008, *Flow through open channels*, Oxford University Press, New Delhi.
4. Jain.A.K.,2016 , *Fluid Mechanics (Including Hydraulic Machines)*, Khanna Publishers, Twelfth Edition.
5. Subramanya.K.,2010, *Fluid Mechanics and Hydraulic Machines*, Tata McGraw Hill Education Private Limited, New Delhi.

**CE1402****CONCRETE TECHNOLOGY**

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To impart knowledge to the students on the properties of materials for concrete by suitable tests, mix design for concrete and special concretes.

**UNIT I      CONSTITUENT MATERIALS****9**

Cement - Different types - Chemical composition and Properties – Hydration of cement - Tests on cement - IS Specifications - Aggregates – Classification - Mechanical properties and tests as per BIS - Grading requirements – Water - Quality of water for use in concrete.

**UNIT II      CHEMICAL AND MINERAL ADMIXTURES****9**

Accelerators – Retarders - Plasticizers - Super plasticizers - Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline -



2. Bhavikatti.S.S, 2015 “Concrete Technology”, I.K.International Publishing House Pvt. Ltd., New Delhi.
3. Santhakumar. A.R.,2006, “Concrete Technology”, Oxford University Press India.

**REFERENCES:**

1. Neville, A.M;1995, "Properties of Concrete", Pitman Publishing Limited, London.
2. Gambhir, M.L;2007, "Concrete Technology", 3<sup>rd</sup> Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi.
3. IS10262-2009, 1998, Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi.
4. Job Thomas,2015, “Concrete Technology”, Cengage Learning India Pvt. Ltd., Delhi.
5. Kumar P Mehta., Paulo J M Monterio., “Concrete - Microstructure, Properties and Materials”, 2016, McGraw Hill Education (India) Private Limited, New Delhi.

**CE1403 CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICES**

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- The main objective of this course is to make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities.

**UNIT I CONSTRUCTION TECHNIQUES 9**

Structural systems - Load Bearing Structure - Framed Structure - Load transfer mechanism – floor system - Development of construction techniques - High rise Building Technology - Seismic effect -3D Printing-Hybrid Concrete Construction- Environmental impact of materials – responsible sourcing - Eco Building (Green Building) - Material used - Construction methods - Natural Buildings - Passive buildings - Intelligent(Smart) buildings - Meaning - Building automation - Energy efficient buildings for various zones-Case studies of residential, office buildings and other buildings in each zones

**UNIT II CONSTRUCTION PRACTICES 9**

Specifications, details and sequence of activities and construction co-ordination – Site

Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick — weather and water proof – roof finishes – acoustic and fire protection.

**UNIT III SUB STRUCTURE CONSTRUCTION 9**

Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting - driving diaphragm walls, sheet piles - shoring for deep cutting - well points -Dewatering and stand by Plant equipment for underground open excavation.

**UNIT IV SUPER STRUCTURE CONSTRUCTION 9**

Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors - Erection of articulated structures, braced domes and space decks.

**UNITV CONSTRUCTION EQUIPMENT 9**

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end loaders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching, mixing and concreting - Equipment for material handling and erection of structures – types of cranes - Equipment for dredging, trenching, tunneling.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES**

Upon successful completion of course the students will be able to

CO1 Understand various construction techniques

CO2 illustrate of the construction practices followed in various construction works

CO3 Know about various construction techniques used in underground level construction works

CO4 Outline about various construction practices used in elevated level construction

works.

CO5 Aware of the various construction equipment and its applications

**TEXTBOOKS :**

1. Peurifoy, R.L., Ledbetter, W.B. & Schexnayder, C., 1995, *Construction Planning, Equipment and Methods*, 5<sup>th</sup> Edition, McGraw Hill, Singapore.
2. Arora S.P. & Bindra S.P., 1997, *Building Construction, Planning Techniques and Method of Construction*, Dhanpat Rai and Sons,.
3. Varghese, P.C., 2007, *Building construction*, Prentice Hall of India Pvt. Ltd, New Delhi,.

**REFERENCES:**

1. Jha J and Sinha S.K., 1999, *Construction and Foundation Engineering*, Khanna Publishers,.
2. Sharma S.C., 2002, *Construction Equipment and Management*, Khanna Publishers New Delhi,.
3. Deodhar, S.V., 2012, *Construction Equipment and Job Planning*, Khanna Publishers, New Delhi,.
4. Mahesh Varma, 1983, *Construction Equipment and its Planning and Application*, Metropolitan Book Company, New Delhi,.

**CE1404**

**SOIL MECHANICS (Theory cum Lab)**

L	T	P	C
3	0	2	4

**OBJECTIVES:**

- To impart knowledge to classify the soil based on index properties and to assess their engineering properties based on the classification.
- To familiarize the students about the fundamental concepts of compaction, flow through soil, stress transformation, stress distribution, consolidation and shear strength of soils.
- To impart knowledge of design of both finite and infinite slopes.

**UNIT I SOIL CLASSIFICATION AND COMPACTION**

**9 + 6**

History – formation and types of soil – composition - Index properties – Classification – BIS – AASHTO – Unified classification system – phase relationship – Compaction theory – laboratory and field technology – field Compaction method – factors influencing compaction.

**UNIT II      EFFECTIVE STRESS AND PERMEABILITY      9 + 6**

Soil - water – Static pressure in water - Effective stress concepts in soils – Capillary phenomena–Permeability – Darcy's law – Determination of Permeability — Factors influencing permeability of soils –Unconfined and Confined aquifer- Seepage - Two dimensional flow – Laplace's equation – Introduction to flow nets

**UNIT III      STRESS DISTRIBUTION AND SETTLEMENT      9 + 6**

Stress distribution in homogeneous and isotropic medium – Boussinesq theory – (Point load, Line load and udl) Use of Newmarks influence chart –Components of settlement – Immediate and consolidation settlement – Factors influencing settlement – Terzaghi's one dimensional consolidation theory – Computation of rate of settlement. –  $\sqrt{t}$  and  $\log t$  methods.  $e$ - $\log p$  relationship - determination of pre consolidation pressure consolidation settlement N-C clays – O.C clays – Computation.

**UNIT IV      SHEAR STRENGTH      9 + 6**

Shear strength of cohesive and cohesion less soils – Mohr-Coulomb failure theory – shear strength - Direct shear, Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – Factors influencing shear strength of soil.

**UNIT V      SLOPE STABILITY      9 + 6**

Infinite slopes and finite slopes — Friction circle method – Use of stability number –Guidelines for location of critical slope surface in cohesive and  $c - \phi$  soil – Slope protection measures.

**TOTAL: 75 PERIODS**

**Exercises to learn the principles and procedures of testing of Soil**

**OBJECTIVE:**

To develop skills to test the soils for their index and engineering properties and to characterize the soil based on their properties.

**EXERCISES:**

**DETERMINATION OF INDEX PROPERTIES**

Specific gravity of soil solids  
Grain size distribution – Sieve analysis  
Grain size distribution - Hydrometer analysis  
Liquid limit and Plastic limit tests  
Shrinkage limit and Differential free swell tests

### **DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS**

Field density Test (Sand replacement method and core cutter method)  
Determination of moisture – density relationship using standard Proctor compaction test.  
Determination of relative density (Demonstration only)

### **DETERMINATION OF ENGINEERING PROPERTIES**

Permeability determination (constant head and falling head methods)  
One dimensional consolidation test (Determination of Co-efficient of consolidation only)  
Direct shear test in cohesionless soil  
Unconfined compression test in cohesive soil  
Laboratory vane shear test in cohesive soil  
Tri-axial compression test in cohesionless soil (Demonstration only)  
California Bearing Ratio Test

### **COURSE OUTCOMES:**

Upon successful completion of course the students will be able to

- CO1 Summarize the classification of soil and soil properties
- CO2 Describe the effective stress concepts and permeability of soil
- CO3 Outline stress distribution of soil
- CO4 Explain about shear strength of soil
- CO5 Narrate the slope stability in soil and slope protection measures

### **TEXTBOOKS:**

1. Murthy, V.N.S., 2014 “*Text book of Soil Mechanics and Foundation Engineering*”, CBS Publishers Distribution Ltd., New Delhi.
2. Arora, K.R., 7th Edition, 2017(Reprint). “*Soil Mechanics and Foundation Engineering*”, Standard Publishers and Distributors, New Delhi,

3. GopalRanjan, A S R Rao, 2016. “*Basic and Applied Soil Mechanics*” New Age International Publication, 3rd Edition,
4. Punmia, B.C., 2017 “*Soil Mechanics and Foundations*”, Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition.

#### **REFERENCES:**

1. McCarthy, D.F., 2006. “*Essentials of Soil Mechanics and Foundations: Basic Geotechnics*”. Prentice-Hall.
2. Coduto, D.P., 2010 “*Geotechnical Engineering – Principles and Practices*”, Prentice Hall of India Pvt. Ltd. New Delhi.
3. Braja M Das, 2014 “*Principles of Geotechnical Engineering*”, Cengage Learning India Private Limited, 8th Edition.
4. Palanikumar.M., 2013 “*Soil Mechanics*”, Prentice Hall of India Pvt. Ltd, Learning Private Limited Delhi,.
5. Craig.R.F., 2012. “*Soil Mechanics*”, E & FN Spon, London and New York,
6. Purushothama Raj. P., 2013 “*Soil Mechanics and Foundations Engineering*”, 2nd Edition, Pearson Education,.
7. Venkatramaiah.C., 2017 “*Geotechnical Engineering*”, New Age International Pvt. Ltd., New Delhi,
8. “*Soil Engineering Laboratory Instruction Manual*” ,2010 published by Engineering College Cooperative Society, Anna University, Chennai.
9. Lambe T.W., 2008 “*Soil Testing for Engineers*”, John Wiley and Sons, New York, 1951. Digitized.
10. Saibaba Reddy, E.Ramasastri, K. 2002 “*Measurement of Engineering Properties of Soils*” New age International (P) Limited Publishers, New Delhi,.
11. IS Code of Practice (2720) Relevant Parts, as amended from time to time, Bureau of Indian Standards, New Delhi.

#### **LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS**

##### **Sl.No. Description of Equipment Quantity**

- |    |        |        |
|----|--------|--------|
| 1. | Sieves | 2 sets |
|----|--------|--------|

2.	Hydrometer	2 sets
3.	Liquid and Plastic limit apparatus	2 sets
4.	Shrinkage limit apparatus	3 sets
5.	Proctor Compaction apparatus	2 sets
6.	UTM of minimum of 20kN capacity	1
7.	Direct Shear apparatus	1
8.	Thermometer	2
9.	Sand replacement method accessories and core cutter method accessories	
10.	Tri-axial Shear apparatus	1
11.	Three Gang Consolidation test device	1
12.	Relative Density apparatus	1
13.	Van Shear apparatus	1
14.	Weighing machine – 20kg capacity	1 No
	Weighing machine – 1kg capacity	3 No

**CE1405**

**STRENGTH OF MATERIALS II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To know the method of finding slope and deflection of beams and trusses using energy theorems and to know the concept of analysing indeterminate beam
- To estimate the load carrying capacity of columns, stresses due to unsymmetrical bending and various theories for failure of material.

**UNIT I ENERGY PRINCIPLES**

**9**

Strain energy and strain energy density – strain energy due to axial load (gradual, sudden and impact loadings) , shear, flexure and torsion – Castigliano’s theorems – Maxwell’s reciprocal theorem - Principle of virtual work – unit load method - Application of energy theorems for computing deflections in determinate beams , plane frames and plane trusses – lack of fit and temperature effects - Williot Mohr's Diagram.

**UNIT II INDETERMINATE BEAMS**

**9**



2. Rattan.S.S., *Strength of Materials*, Tata McGraw Hill Education Pvt. Ltd., New Delhi,
3. Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain., 2017, *Theory of Structures (SMTS) Vol - II*, Laxmi Publishing Pvt Ltd, New Delhi.
4. Basavarajiah and Mahadevapa., 2016, *Strength of Materials*, University press, Hyderabad.

**REFERENCES:**

1. Kazimi S.M.A., 2003, *Solid Mechanics*, Tata McGraw-Hill Publishing Co., New Delhi,
2. William A .Nash., 2007, *Theory and Problems of Strength of Materials*,Schaum's Outline Series, Tata McGraw Hill Publishing company,.
3. Singh. D.K., 2016, *Strength of Materials*,Ane Books Pvt. Ltd., New Delhi,
- Egor P Popov., 2012, *Engineering Mechanics of Solids*, 2nd edition, PHI Learning Pvt. Ltd., New Delhi,

**CE1411 STRENGTH OF MATERIALS LABORATORY**

L	T	P	C
0	0	4	2

**OBJECTIVES:**

- To expose the students to the testing of different materials under the action of various forces and determination of their characteristics experimentally

**LIST OF EXPERIMENTS:**

1. Tension test on steel rod
2. Compression test on wood
3. Double shear test on metal
4. Torsion test on mild steel rod
5. Impact test on metal specimen (Izod and Charpy)
6. Hardness test on metals (Rockwell and Brinell Hardness Tests)
7. Deflection test on metal beam
8. Compression test on helical spring
9. Deflection test on carriage spring

**TOTAL: 60 PERIODS**

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS**

Sl. No.	Description of Equipment	Quantity
1.	UTM of minimum 400 kN capacity	1
2.	Torsion testing machine for steel rods	1
3.	Izod impact testing machine	1
4.	Hardness testing machine (any 2) i. Rockwell ii. Brinnel iii. Vicker"s	1 each
5.	Beam deflection test apparatus	1
6.	Extensometer	1
7.	Compressometer	1
8.	Dial gauges	few
9.	Le Chatelier's apparatus	2
10.	Vicat"s apparatus	2
11.	Mortar cube moulds	10

### COURSE OUTCOMES

Upon successful completion of course the students will be able to

- CO1 practice in universal testing machine to determine the maximum strength of the materials.
- CO2 Practice in torsion testing machine to determine the Stiffness for member subjected to Torsion.
- CO3 Infer the type of springs and their load carrying capacity.
- CO4 Appraise the characteristics of ductile materials by using hardness, Impact test..
- CO5 Appraise the properties of cement and brick by conducting various tests..

### REFERENCES:

1. *Strength of Materials Laboratory Manual*, Anna University, Chennai-600 025.
2. IS 432(Part I ) -1992 – *Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement*
3. Rajput.R.K. *Strength of Materials*, S.Chand& Company Ltd., New Delhi 2014

**HS1421 AN INTRODUCTION TO ADVANCED READING AND WRITING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**OBJECTIVES:**

The course will enable learners to

- To strengthen the reading skills of students of engineering.
- To enhance their writing skills with specific reference to technical writing
- To develop their critical thinking skills.
- To provide more opportunities to develop their project and proposal writing skills

**UNIT I EFFECTIVE READING 6**

Reading – Strategies for effective reading-Use glosses and footnotes to aid reading comprehension- Read and recognize different text types-Predicting content using photos and title. Reading-Read for details-Use of graphic organizers to review and aid comprehension.

**UNIT II CRITICAL READING 6**

Reading– Understanding pronoun reference and use of connectors in a passage- speed reading techniques. Reading– Genre and Organization of Ideas- Reading– Critical reading and thinking- understanding how the text positions the reader.

**UNIT III PARAGRAPH WRITING 6**

Writing-Plan before writing- Develop a paragraph: topic sentence, supporting sentences, concluding sentence.-Write a descriptive paragraph Writing-State reasons and examples to support ideas in writing– Write a paragraph with reasons and examples- Write an opinion paragraph

**UNIT IV ESSAY WRITING 6**

Writing– Elements of a good essay - Types of essays- descriptive-narrative- issue-based-argumentative-analytical.

**UNIT V EFFECTIVE WRITING 6**

Writing– Email writing- visumes – Job application- Report Writing - Project writing-Writing convincing proposals

**TOTAL: 30 PERIODS**

## **COURSE OUTCOMES:**

At the end of the course, students will be able to

- CO1 Understand how the text positions the reader
- CO2 Develop critical thinking while reading a text
- CO3 Develop a descriptive paragraph
- CO4 Make use of sentence structures effectively when creating an essay.  
Demonstrate proper usage of grammar in writing E-Mails, Job application and project proposals
- CO5

## **TEXT BOOKS:**

1. Gramer, F, Margot & Colin, S, Ward, 2011, *Reading and Writing (Level 3)* Oxford University Press, Oxford.
2. Debra Daise, CharlNorloff, and Paul Carne, 2011, *Reading and Writing (Level 4)* Oxford University Press: Oxford.
- 3.

## **REFERENCE BOOKS:**

1. Davis, Jason & Rhonda Llss. 2006 *Effective Academic Writing (Level 3)* Oxford University Press: Oxford.
2. E. Suresh Kumar and et al. 2012, *Enriching Speaking and Writing Skills*, Second Edition, Orient Black swan: Hyderabad.
3. Withrow, Jeans and et al. 2004 *Inspired to Write. Readings and Tasks to develop writing skills*, Cambridge University Press: Cambridge.
4. Goatly, Andrew, 2000 *Critical Reading and Writing*, Routledge: United States of America.
5. Petelin, Roslyn & Marsh Durham, 2004 *The Professional Writing Guide: Knowing Well and Knowing Why*, Business & Professional Publishing: Australia.

## **WEB RESOURCES:**

- <http://learnenglishteens.britishcouncil.org/skills/reading>
- <https://learnenglish.britishcouncil.org/skills/reading>
- <https://www.readingrockets.org/article/25-activities-reading-and-writing-fun>
- <https://linguapress.com/advanced.htm>