GOVERNMENT COLLEGE OF TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University)

Coimbatore - 641 013

Curriculum & Syllabi

B. E. CIVIL ENGINEERING

(Working Professionals)

2025

Regulations

OFFICE OF THE CONTROLLER OF EXAMINATIONS
GOVERNMENT COLLEGE OF TECHNOLOGY
THADAGAM ROAD, COIMBATORE - 641 013
PHONE 0422 - 2433355
E.mail: gctcoe@gct.ac.in

◆···◆

FIRST SEMESTER

Sl. No.	Course Code	Course Title	CA Marks	End Sem Marks	Total Marks	L	T	P	C
THEORY									
1	25WPC1Z1	Applied Mathematics I (Common to Civil, Mech, EEE & ECE)	40	60	100	3	0	0	3
2	25WPC1Z2	Environmental Sciences and Engineering (Common to Civil, Mech, EEE & ECE)	40	60	100	3	0	0	3
3	25WPC103	Engineering Mechanics	40	60	100	3	0	0	3
4	25WPC104	Fluids Mechanics and Machinery	40	60	100	3	0	0	3
PRACTICAL									
5	25WPC105	Fluid Mechanics and Machinery Laboratory	60	40	100	0	0	3	1.5
		TOTAL	220	280	500	12	0	3	13.5

SECOND SEMESTER

Sl. No.	Course Code	Course Title	CA Marks	End Sem Marks	Total Marks	L	T	P	C
THEORY									
1	25WPC201	Construction Materials	40	60	100	3	0	0	3
2	25WPC202	Plane and Geodetic Surveying	40	60	100	3	0	0	3
3	25WPC203	Strength of Materials	40	60	100	3	0	0	3
4	25WPC204	Engineering Geology	40	60	100	3	0	0	3
PRACTICAL									
5	25WPC205	Materials Testing Laboratory	60	40	100	0	0	3	1.5
		TOTAL	300	280	500	12	0	3	13.5

25WPC1Z1	APPLIED MATHEMATICS I *(Common to MECH, EEE & ECE Branches)*	SEMESTER I

PREREQUISITES		L	T	P	C
NIL		3	0	0	3
Course Objectives	This course mainly deals with topics such as linear algebra, single variable calculus and numerical methods and plays an important role in the understanding of engineering science.				
UNIT – I	**LINEAR ALGEBRA**			**9 Periods**	
Consistency of System of Linear Equations, Eigenvalues and eigenvectors, Diagonalization of matrices by orthogonal transformation, Cayley-Hamilton Theorem, Quadratic form to canonical forms.					
UNIT – II	**DIFFERENTIAL CALCULUS**			**9 Periods**	
Radius of curvature, Centre of curvature, Circle of curvature , Evolutes of a curve, Envelopes					
UNIT – III	**INTEGRAL CALCULUS**			**9 Periods**	
Evaluation of definite and improper integrals, Applications: surface area and volume of revolution (Cartesian coordinates only).					
UNIT – IV	**NUMERICAL SOLUTION OF EQUATIONS**			**9 Periods**	
Algebraic and Transcendental equation: Fixed point iteration method, Bisection method, Newton-Raphson method, Simultaneous equation: Gauss elimination method, Gauss-Jordan method, Gauss Seidal method.					
UNIT – V	**NUMERICAL INTERPOLATION**			**9 Periods**	
Equal interval: Newton's forward and Backward difference interpolation formulae, Gauss forward and Backward difference interpolation formulae, Unequal interval: Lagrange's interpolation, Newton's divided difference interpolation.					
Contact Periods: **Lecture: 45 Periods** **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**					

TEXT BOOK

1	*Veerarajan T.,* **Engineering Mathematics I**, *Tata McGraw-Hill Education(India)Pvt. Ltd, New Delhi, 1ˢᵗ edition 2017.*
2	*P. Kandasamy, K. Thilagavathy, K. Gunavathi,* **Numerical Methods**, *S. Chand & Company, 3rd Edition, Reprint 2013.*

REFERENCES

1	*B.S.Grewal,* **Higher Engineering Mathematics**, *Khanna Publishers, 44ᵗʰEdition, 2021.*
2	*David C.Lay,* **Linear Algebra and its Application**, *Pearson Publishers, 6ᵗʰEdition,2021.*
3	*Howard Anton,* **Elementry Linear Algebra**,*11ᵗʰEdition,WileyPublication, 2013.*
4	*Narayanan.S and Manicavachagom Pillai. T.K. –* **Calculas Vol I and Vol II,** *S.chand & Co, 6ᵗʰ Edition, 2016.*
5	*S.S. Sastry,* **Introductory methods of numerical analysis**, *PHI, New Delhi, 5ᵗʰ Edition, 2015.*
6	*Ward Cheney, David Kincaid,* **Numerical Methods and Computing,** *Cengage Learning, Delhi, 7ᵗʰ Edition 2013.*
7	*Jain R.K. and Iyengar S.R.K., -* **Advanced Engineering Mathematics**, *Narosa Publicaitons, 8ᵗʰ Edition, 2012.*

COURSE OUTCOMES:	Bloom's Taxonomy Mapped
Upon completion of the course, the students will be able to:	
CO1 Use the essential tool of matrices and linear algebra in a comprehensive manner.	K3
CO2 Explain the fallouts of circle of curvature, evolute and envelops that is fundamental to application of analysis to Engineering problems.	K3
CO3 Interpret the integral calculus to notions of definite and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.	K3
CO4 Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to polynomial and transcendental equations.	K3
CO5 Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations.	K3

25WPC1Z2	ENVIRONMENTAL SCIENCE AND ENGINEEREING *(Common to MECH, EEE & ECE Branches)*	SEMESTER I

PREREQUISITES	L	T	P	C
NIL	3	0	0	3

Course Objectives	The course is aimed at creating awareness among the students and also inseminates the critical ideas of preserving environment.

UNIT – I	**ENVIRONMENTAL ENERGY RESOURCES**	**9 Periods**

Food-effects of modern agriculture, fertilizers, pesticides, eutrophication & biomagnifications-Energy resources: renewable resources - Hydro Energy, Solar & Wind. Non-renewable resources – Coal and Petroleum - harnessing methods.

UNIT – II	**ECO SYSTEM AND BIODIVERSITY**	**9 Periods**

Eco system and its components - biotic and abiotic components. Biodiversity: types and values of biodiversity, hot spots of biodiversity, endangered and endemic species, conservation of biodiversity: In situ and ex situ conservation. Threats to biodiversity-destruction of habitat, habit fragmentation, hunting, over exploitation and man-wildlife conflicts. The IUCN red list categories.

UNIT – III	**ENVIRONMENTAL POLLUTION**	**9 Periods**

Air pollution, classification of air pollutants – sources, effects and control of gaseous pollutants SO_2, NO_2, H_2S, CO, CO_2 and particulates. Water pollution - classification of water pollutants, organic and inorganic pollutants, sources, effects and control of water pollution. Noise pollution - decibel scale, sources, effects and control.

UNIT – IV	**ENVIRONMENTAL THREATS**	**9 Periods**

Global warming-measure to check global warming - impacts of enhanced Greenhouse effect, Acid rain- effects and control of acid rain, ozone layer depletion- effects of ozone depletion, disaster management - flood, drought, earthquake and tsunami.

UNIT – V	**SOCIAL ISSUES AND ENVIRONMENT**	**9 Periods**

Water conservation, rain water harvesting, e-waste management, Pollution Control Act, Wild life Protection Act. Population growth- exponential and logistic growth, variation in population among nations, population policy. Women and Child welfare programs. Role of information technology in human and health, COVID-19 - effects and preventive measures.

Contact Periods:
Lecture:45 Periods　　　**Tutorial: 0 Periods**　　　**Practical: 0 Periods**　　　**Total:45 Periods**

TEXT BOOK:

1	*Sharma J.P., "Environmental Studies", 4th Edition, University Science Press, New Delhi, 2016.*
2	*Anubha Kaushik and C.P.Kaushik, "Environmental Science and Engineering", 7th Edition, New age international publishers, New Delhi, 2021.*

REFERENCES:

1	*A k de, "Environmental Chemistry", 8th edition, New age international publishers, 2017.*
2	*G. Tyler miller and scott e. Spoolman, "Environmental Science", cengage learning india pvt. Ltd., delhi, 2014.*
3	*Erach Bharucha, "Textbook of Environmental Studies", Universities press (I) pvt, Ltd., Hydrabad, 2015.*
4	*Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 3rd Edition, Pearson Education, 2015.*

	COURSE OUTCOMES:	Bloom's Taxonomy Mapped
	Upon completion of the course, the students will be able to:	
CO1	Recognize and understand about the various environmental energy resources and the effective utility of modern agriculture.	K2
CO2	Acquire knowledge about the interaction of biosphere with environment and conservation methods of bio diversity.	K2
CO3	Be aware of the sources of various types of pollution, their ill effects and preventive methods.	K2
CO4	Identify and take the preventive measures to control the environmental threats and effects of Global warming, Ozone depletion, Acid rain, and natural disasters.	K2
CO5	Demonstrate an idea to save water and other issues like COVID -19.	K2

25WPC103	ENGINEERING MECHANICS	SEMESTER I

PREREQUISITES :	L	T	P	C
NIL	3	0	0	3

Course Objectives	To expose the students to use the basic principles of mechanics in engineering applications.

UNIT – I	BASIC CONCEPTS OF FORCES	9 Periods

Basic Concepts and Principles of Forces– Laws of Mechanics – System of forces in Plane – Free body Diagrams- resultant of a force system – resolution and composition of forces – Lami's theorem – moment of a force – physical significance of moment-Varignon's theorem – resolution of a force and couple system– forces in space – addition of concurrent forces in space – equilibrium of a particle in space.

UNIT – II	STATIC AND DYNAMIC FRICTION	9 Periods

Frictional resistance – classification of friction- laws of friction – coefficient of friction-angle of friction – angle of repose — cone of friction –advantages-equilibrium of a body on a rough inclined plane – ladder friction – rope friction – wedge friction.

UNIT – III	PROPERTIES OF SECTION	9 Periods

Centroid and Centre of Gravity for simple & Composite sections– theorems of moment of inertia Determination of moment of inertia of various sections –Product of Inertia – Principal moment of inertia of plane areas.

UNIT – IV	BASICS OF DYNAMICS - KINEMATICS	9 Periods

Kinematics and kinetics – displacements, velocity and acceleration - Equations of motion – Rectilinear motion of a particle with uniform velocity, uniform acceleration, varying acceleration– motion under gravity – relative motion – curvilinear motion of particles – projectiles– angle of projection – range – time of flight and maximum height.

UNIT – V	BASICS OF DYNAMICS - KINETICS	9 Periods

Newton's second law of motion – linear momentum – D'Alembert's principle, Dynamic equilibrium – equation of particles- principle of work and energy – law of conservation of energy – Principle of impulse and momentum – Equations of momentum – Laws of conservation of momentum. Impact – Time of compression, restitution, collision – Co-efficient of restitution – types of impact – collision of elastic bodies by direct central impact and oblique impact – collision of small body with a massive body – Kinetic energy of a particle.

Contact Periods:
Lecture: 45 Periods   Tutorial: 0 Periods   Practical: 0 Periods   Total: 45 Periods

Text Book:

1	*F.B. Beer and E.R. Johnson, "Vector Mechanics for Engineers", Tata Mc.Graw Hill Pvt Ltd, 11th Edition, 2013.*
2	*Rajasekaran S &Sankara Subramanian, "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt Ltd. 3rd Edition, 2017.*

REFERENCES:

1	*S. Timoshenko and Young, "Engineering Mechanics", McGraw Hill, 4th Edition, 2017.*
2	*Bansal R.K, "A Text Book of Engineering Mechanics", Laxmi Publications, 2015.*
3	*R.C. Hibbeller, "Engineering Mechanics", Prentice Hall of India Ltd, 14th Edition, 2017.*
4	*Dr.N.Kottiswaran"Engineering Mechanics"Sri Balaji Publications,2017.*

COURSE OUTCOMES:	Bloom's Taxonomy Mapped
Upon completion of the course, the students will be able to:	
CO1	Familiarize the principles and Concepts of Mechanics	K3
CO2	Calculate the friction force acting on a plane under various conditions.	K2
CO3	Determine the centre of gravity and moment of inertia for different sections.	K2
CO4	Predict the Rectilinear and curvilinear motion of particles.	K3
CO5	Evaluate the dynamics of particles using kinetic principles.	K3

25WPC104	FLUID MECHANICS AND MACHINERY	SEMESTER I

PREREQUISITES		L	T	P	C
NIL		3	0	0	3
Course Objectives	To impart knowledge on properties and behaviour of fluid at static and dynamic conditions and also study the performance of turbines and pumps				
UNIT – I	**FUNDAMENTALS OF FLUID STATICS**				**9 Periods**
Dimensions and Units - Properties of fluids - Density, specific gravity, viscosity, surface tension, capillarity, elasticity, compressibility, vapour Pressure - Fluid statics – Pascal's Law - Pressure measurement - Piezometer and Manometers – Hydrostatic forces on plane and curved surfaces					
UNIT – II	**FLUID KINEMATICS AND DYNAMICS**				**9 Periods**
Classification of fluid flow – Continuity equation - one dimensional and three dimensional –Velocity potential and stream functions - Energy equation – Euler's and Bernoulli's equation – Applications - Venturimeter, Orifice meter and Pitot tube					
UNIT – III	**FLOW THROUGH CONDUITS AND BOUNDARY LAYER THEORY**				**9 Periods**
Laminar flow between parallel plates – laminar flow in pipes - Hagen Poiseuille equation for flow through circular pipes - Turbulent flow in pipes – Darcy - Weisbach formula for flow through circular pipes - Boundary layer - Definition - Boundary layer thickness - Displacement, energy and momentum thickness					
UNIT – IV	**IMPACT OF JETS AND PUMPS**				**9 Periods**
Impulse momentum Principle- impact of Jet – force exerted by a jet on normal, inclined and curved surfaces for stationary and moving vanes- Angular momentum principle- construction of velocity vector diagrams. Pump- Classification of pumps - Centrifugal pump - reciprocating pump – Work done and efficiency					
UNIT – V	**HYDRAULIC TURBINES**				**9 Periods**
Turbines - classification – construction – working principles and design of Pelton wheel and Francis Turbines – wok done and efficiency – specific speed – operating characteristics.					
Contact Periods: Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods					

TEXT BOOKS :

1	*P.N.Modi and S.M.Seth, **"Hydraulics and Fluid Mechanics, Including Hydraulic Machines"**, Standard Book House, New Delhi, 2019.*
2	*R.K.Bansal, **"Fluid Mechanics and Hydraulic Machines"**, Laxmi Publications (P) Ltd., New Delhi, 2018.*

REFERENCES :

1	*R.K.Rajput, "**A Text Book of Fluid Mechanics and Hydraulic Machines**", S.Chand and Company, New Delhi,2015.*
2	*K.L.Kumar, "**Engineering Fluid Mechanics**", Eurasia Publishing House (P) Ltd., New Delhi, 2018.*
3	*Jagdish Lal, "**Fluid Mechanics & Hydraulic With Computer Applications**", Tata McGraw Hill, New Delhi , 2008.*

4	*M.K.Natarajan "**Principles of Fluid Mechanics**", Anuradha Agencies, VidayalKaruppur, Kumbakonam, 2008.*

COURSE OUTCOMES: Upon completion of the course, the students will be able to:		Bloom's Taxonomy Mapped
CO1	Identify the properties of fluids and fluid statics.	K2
CO2	Apply the continuity equation, Euler's equation and Bernoulli's equation for solving fluid flow problems.	K3
CO3	Examine the fluid flow behaviour for laminar and turbulent flows and also determine boundary layer thickness	K3
CO4	Apply the momentum principle for the determination of hydrodynamic forces	K3
CO5	Acquire knowledge in selection and design of turbines based on head and discharge requirements.	K3

25WPC105	FLUID MECHANICS AND MACHINERY LABORATORY	SEMESTER I

PREREQUISITES		L	T	P	C
	NIL	0	0	3	1.5

Course Objectives	To impart knowledge in solving problems occurring in a pipes due to losses, the verification of bernoulli's theorem and its applications and conducting performance tests on different types of pumps and turbines.

LIST OF EXPERIMENTS:

1. Determination of Darcy's friction factor
2. Verification of Bernoulli's Theorem
3. Determination of coefficient of discharge of Venturimeter / Orifice meter
4. Flow over Notches
5. Flow through Mouthpiece
6. Performance Study of Centrifugal pump
7. Performance Study of reciprocating pump
8. Load test on Pelton wheel
9. Load test on Francis turbine

Contact Periods:

Lecture: 0 Periods   Tutorial: 0 Periods   Practical: 45 Periods   Total: 45 Periods

COURSE OUTCOMES: Upon completion of the course, the students will be able to:		Bloom's Taxonomy Mapped
CO1	Solve different problems in pipes due to losses.	K3
CO2	Verify the Bernoulli's theorem and its applications.	K3
CO3	Can carry out flow measurement through notches	K3
CO4	Do performance tests on different types of pumps.	K3
CO5	Do performance tests on different types of turbines.	K3

25WPC201	CONSTRUCTION MATERIALS	SEMESTER II

PREREQUISITES		L	T	P	C
NIL		3	0	0	3

Course Objectives	To learn the testing procedures and applications of materials used for building construction.

UNIT – I	CONVENTIONAL MATERIALS AND PROPERTIES	9 Periods

History of building materials-Conventional building materials-Aggregates-Natural aggregates-Artificial Aggregates-Water- Requirements of water used in construction works-Steel-New and advanced materials -Eco friendly and green construction materials- Energy efficient and sustainable building materials.

UNIT – II	CEMENTITIOUS MATERIALSAND MORTAR	9 Periods

Cement - Types and Grades-Water cement ratio-Hydration of cement- Setting of cement-Bogue's Compounds- Tests on Cement. Supplementary cementitious materials-Pozzolanic materials-Fly ash-Types-Ground Granulated blast furnace slag- Silicafume- Natural Pozzolans. Cement Mortar properties–Tests on Cement Mortar.

UNIT – III	PROTECTIVE MATERIALS AND COATINGS	9 Periods

Damp proof–Water proof-Termite proof –Pest control in buildings-Heat insulating materials-Sound insulating materials. Paints-Characteristics of ideal paint-Types of paints-Distemper-Varnishes.

UNIT – IV	FLOOR FINISH AND ROOFING MATERIALS	9 Periods

Floor Finish Materials – Wood- stone (marble, granite, slate) –porcelain tiles- Ceramic Tiles-Glazed tiles-Thermal care tiles-properties- selection criteria. Types of roofing materials- fibre reinforced sheets-Insulated roofing sheets-False ceiling-Materials used for false ceiling.

UNIT – V	METALLIC, PLASTIC AND COMPOSITE MATERIALS	9 Periods

Aluminum Products–Properties and Applications. Plastics –Characteristics –PVC –UPVC-Doors and windows, Water tanks-CPVC-PVC materials used in water supply, sanitary and electricity plumbing- Standards as per BIS. Elevation and façade materials- Types of materials used—Insulated glass, Aluminum composite panels, Fibre cement, Wood Plastic composites, cladding- types.

Contact Periods:

Lecture:45Periods   Tutorial: 0 Periods   Practical:0 Periods   Total: 45 Periods

TEXTBOOK

1	*Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, **"Building Construction"**, Laxmi Publications Pvt.Ltd., 2016.*
2	*G.S.Birdie, T.D.Ahuja, **"Building Construction and Construction Materials"**, Dhanpatrai publishing company, New Delhi, 2012.*

REFERENCES

1	*Varghese.P.C, **"Building Materials"**, PHI Learning Pvt. Ltd, New Delhi, 2015.*
2	*Gambhir. M.L., & NehaJamwal., **"Building Materials, Products, Properties and Systems"**, Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2012.*
3	*Sushil Kumar, **"Building Construction"**, Standard Publications, New Delhi, 2016.*
4	*Shetty,M.S&Jain,A.K, **"Concrete Technology: Theory and Practice"**, S.Chand and Company Ltd, New Delhi, 2019.*

	COURSE OUTCOMES: Upon completion of the course, the students will be able to:	Bloom's Taxonomy Mapped
CO1	Examine and compare the properties of most common and advanced building materials.	K2
CO2	Identify the appropriate quality of cementitious materials and properties of mortar.	K2
CO3	Gain Knowledge in protective materials.	K1
CO4	Select the suitable flooring Wand roofing materials.	K2
CO5	Recognize the characteristics and applications of plastic and composite materials.	K3

25WPC202	PLANE AND GEODETIC SURVEYING	SEMESTER II

PREREQUISITES	L	T	P	C
NIL	3	0	0	3

Course Objectives	To understand the basic principle and concepts of different surveying methods to calculate various measurements using survey instruments.

UNIT – I	INTRODUCTION, LEVELLING AND CONTOURING	9 Periods

Definition- Principles - Classification – Field and Office work – Scales – Conventional Signs. Basic Terms - Types of Level – Fundamental Axes - Levelling staff – Bench Marks – Temporary and Permanent Adjustments – Types of Levelling - Curvature and Refraction correction –Reciprocal Levelling–Calculation of Areas and Volumes. Contouring– Characteristics and Uses of Contours – Methods of contouring.

UNIT – II	THEODOLITE SURVEYING	9 Periods

Theodolite–types–Terms-Temporary and Permanent Adjustments–Measurement of Horizontal Angles by Repetition and Reiteration – Closing Error and Distribution – Omitted measurements.

UNIT – III	CURVES AND HYDROGRAPHIC SURVEYING	9 Periods

Simple curves – Elements-Setting out of curves-Linear and angular methods. Shore line survey–Sounding–Equipment– Methods of Locating.

UNIT – IV	TRIANGULATION	9 Periods

Triangulation-classification –Routine- Intervisibility -Signals and Towers. Trigonometrical Levelling - Geodetical observations-Curvature correction- Refraction correction – Axis signal correction–Difference in elevation.

UNIT – V	MODERN SURVEYING INSTRUMENTS	9 Periods

Total Station-Principle-classification-working. Drone Surveying – Introduction - Applications. GPS-Developments –Basic Concepts–Segments –Applications. DGPS – Introduction.

Contact Periods:

Lecture: 45 Periods   Tutorial: 0 Periods   Practical: 0 Periods   Total: 45 Periods

TEXT BOOK:

1	*Punmia B.C, Ashok K Jain, Arun K Jain.* ***"Surveying, Vol. I &II"***, *Lakshmi Publications, 2022.*
2	*Basak N.N,* ***"Surveying and Levelling"***, *Tata McGraw-Hill, Publishing Company, 2nd edition, 2014.*

REFERENCES:

1	*Kanetkar.T.P, and Kulkarni.S.V,* ***"Surveying and Levelling, Vol. I & II"***, *Pune Vidyarthi Griha Prakashan,2014.*
2	*Bhavikatti S.S,***"Surveying and Levelling, Vol.I&II"***, *I.K. International Pvt. Ltd., 2016.*
3	*Duggal S.K***. "Surveying, Vol.I&II"***, *Tata McGraw-Hill Publishing Company,2017.*
4	*Charles D Ghilani, Paul R Wolf.,* ***"Elementary Surveying"***, *Prentice Hall,2012.*
5	*Chandra A.M.,* ***"Plane Surveying"***, *New Age International Pvt. Ltd, 2015.*

	COURSE OUTCOMES: On completion of the course, the students will be able to:	**Bloom's Taxonomy Mapped**
CO1	Apply different survey method, Interpret level data using different types of levelling techniques and plot contour map by various contouring methods.	K3
CO2	Determine the horizontal distances, vertical distances and area by using theodolite.	K3
CO3	Set out the curves using survey instruments and apply the principles of hydrographic surveying.	K3
CO4	Execute triangulation method, Trigonometric levelling to find horizontal distance, difference in elevation and area.	K3
CO5	Apply modern surveying principles and techniques in civil engineering applications.	K3

25WPC203	STRENGTH OF MATERIALS	SEMESTER II

PREREQUISITES	L	T	P	C
ENGINEERING MECHANICS	3	0	0	3

Course Objectives	- To learn the basics of shear and bending stresses and evaluate complex stress problems. - To understand the behavior of beams in bending and twisting. - To impart knowledge on different methods of finding deflection of beam. - To get the concepts on analysis of stresses in cylinders and columns.

UNIT – I	SIMPLE AND COMPLEX STRESSES	9 Periods

Simple Stresses: Axial Members - Deformation, strain, simple stress, Elastic constants - Compound Bars – Thermal Stresses

Complex Stresses: Two mutually Perpendicular direct stresses – Principal Planes and Principal Stresses – Two-Dimensional Stress System – Mohr's circle

UNIT – II	BEAMS	9 Periods

Beams under bending: Beams and Bending – supports and loads - Shear Force and Bending Moment Diagrams for determinate beams – Relationship between rate of Loading, Shear Force and Bending Moment – Point of Contra Flexure.

Bending and shear stresses: Bending Stress – Combined Direct and Bending Stresses - Shearing stress.

UNIT – III	DEFLECTION OF BEAMS	9 Periods

Deflection of beams: Deflection Curve – Differential Equation – Double Integration Method – Macaulay's Method – Conjugate Beam Method.

UNIT – IV	TORSION AND CYLINDERS	9 Periods

Torsion: Torsion of Circular and Hollow Shafts –Elastic Theory of Torsion - Stresses and Deformation in Circular Solid and Hollow Shafts – Stepped Composite Shafts – Combined Bending Moment and Torsion on Shafts –Power Transmitted to a Shaft – Shafts in Series and Parallel. **Thin Cylinders:** Hoop and Longitudinal stresses – Volumetric Strain.

UNIT – V	COLUMNS AND THEORIES OF ELASTIC FAILURE	9 Periods

Columns: Theory of Columns. - eccentric load – Slenderness Ratio – End Conditions – Buckling Load for Columns- Euler's Theory – Assumptions and Limitations – Rankine's Formula – Combined bending and axial load.

Theories of Elastic Failure: Failure theories – Factor of Safety – Graphical Representation of Theories for Two Dimensional Stress System.

Contact Periods:

Lecture: 45 Periods   **Tutorial: 0 Periods**   **Practical: 0 Periods**   **Total: 45 Periods**

TEXTBOOK

1	Rajput R.K**. "Strength of Materials (Mechanics of Solids)"**, S.Chand & company Ltd., New Delhi, 7th edition, 2018.
2	Vaidyanathan.R, Perumal.P and Lingeswari.S, **"Mechanics of Solids and Structures, Volume I"**, Laxmi Publications Pvt Ltd, Chennai, 2017.

REFERENCES

1	Ferdinand Beer, E.Russell Johnston and John Dewolf, **"Mechanics of Materials",** Mc Graw Hill Education, 2015
2	Daniel Schodek and Martin Bechthold, **"Structures",** Pearson India Education Services Pvt Ltd, 2015
3	Singh. D.K., **"Strength of Materials",** Ane Books Pvt Ltd., New Delhi, 2021.
4	Beer. F.P. & Johnston. E.R. **"Mechanics of Materials",** Tata McGraw Hill, 8th Edition, New Delhi 2019.

COURSE OUTCOMES: On completion of the course, the students will be able to:		Bloom's Taxonomy Mapped
CO1	Describe the fundamental concepts of stress, strain and principal stresses.	K2
CO2	Plot shear force and bending moment diagrams and determine bending stress distribution in beams.	K3
CO3	Determine the deflection of beams.	K3
CO4	Analyze the shaft subjected to twisting.	K3
CO5	Identify the stresses in cylinders, behavior of columns and theory of elastic failures.	K3

25WPC204	ENGINEERING GEOLOGY	SEMESTER II

PREREQUISITES		L	T	P	C
	NIL	3	0	0	3

Course Objectives	To understand the importance of geological knowledge such as earth, minerals, rocks and apply Geological Knowledge in projects such as dams, tunnels, bridge constructions.

UNIT – I	GENERAL GEOLOGY	9 Periods

Interrelationship between Geology and civil engineering – Branches of Geology – Earth Structure and composition –Geological processes – Weathering – work of rivers, sea, wind and their Engineering significance- Earthquakes –Earthquake Zones in India - Volcanoes – Ground water – Origin, Occurrence, Properties of rock – Geological work of ground water – Importance in Civil Engineering.

UNIT – II	MINERALOGY	9 Periods

Elementary knowledge on symmetry elements of important Crystallographic systems – Physical properties of minerals – Study of the following rock forming minerals – Quartz family, Felspar family, Augite, Hornblende, Biotite, Muscovite, Calcite, Garnet. Ore minerals - Haematite, Magnetite, Bauxite, Graphite, Magnesite – Clay minerals – Properties and Engineering significance.

UNIT – III	PETROLOGY	9 Periods

Formation and Classification of rocks and their distinctive properties – Description, Occurrence, Engineering properties and Distribution of the following rocks – Igneous rocks – Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt. Sedimentary rocks- Sandstone, Limestone, shale, Conglomerate, and Breccia – Metamorphic rocks – Quartzite, Marble, Slate, phyllite, Gneiss and schist.

UNIT – IV	STRUCTURAL GEOLOGY	9 Periods

Attitude of beds Dip and Strike - Uses of Clinometer compass – Outcrops – Geological maps – their uses – Structural features – Folds, Faults, Unconformities and Joints – their significance on engineering constructions.

UNIT – V	GEOLOGICAL INVESTIGATIONS	9 Periods

Geophysical investigations – Seismic and electrical resistivity methods – Aerial Photo and satellite imageries-Interpretation of remote sensing data-Exploration for ground water – Geological investigations pertaining to Dam and Reservoir, Tunnels and Road cuttings – Landslides – causes and prevention – Sea erosion and coastal protection

Contact Periods:

Lecture:45 Periods   Tutorial: 0 Periods   Practical:0 Periods   Total: 45 Periods

TEXT BOOK

1	*Parbin Singh, **"Engineering and General Geology"**, Eighth Revised Edition S.K.Kataria & Sons New Delhi. 2015*
2	*Varghese, P.C., **"Engineering Geology for Civil Engineering"** PHI Learning Private Limited, New Delhi, 2012.*

REFERENCES

1	*F.G.Bell. **"Fundamentals of Engineering Geology"**, B.S. Publications. Hyderabad 2011*
2	*N. Chenna Kesavulu. **"Textbook of Engineering Geology"**, Macmillan India Ltd., 2009.*
3	*Venkatareddy. D. **"Engineering Geology"**, Vikas Publishing House Pvt. Ltd. 2010*
4	*KVGK Gokhale, **"Principles of Engineering Geology"**, BS Publications, Hyderabad 2011.*

COURSE OUTCOMES: On completion of the course, the students will be able to:		Bloom's Taxonomy Mapped
CO1	Understand the internal structure of earth and its relation to volcanism and the various geological agents.	K2
CO2	Identify the properties and uses of Minerals.	K1
CO3	Understand the formation and Engineering properties of rocks.	K2
CO4	Apply fundamental knowledge in structural geology like fault, fold and Joints	K2
CO5	Knowledge in design and construction of major civil engineering structures.	K2

25WPC205	MATERIALS TESTING LABORATORY	SEMESTER II

PREREQUISITES		L	T	P	C
NIL		0	0	3	1.5

Course Objectives	To deal with experimental determination and evaluation of mechanical characteristics and behaviour of construction materials and to familiarize experimental procedures and common measurement instruments, equipment and devices.

LIST OF EXPERIMENTS

1. Mechanical properties of tor steel rod
2. Tension and compression test on springs.
3. Test on Bricks: Visual observation, Compression test, Water absorption test and Efflorescence test
4. Hardness test on different metals.
5. Deflection test on simply supported beams.
6. Deflection test on cantilever beams.
7. Bending test on rolled steel joist
8. Flexure test on tiles
9. Compression test on Concrete Blocks.
10. Demonstration on behaviour of columns

Contact Periods:

Lecture:0 Periods   Tutorial: 0 Periods   Practical:45 Periods   Total: 45 Periods

COURSE OUTCOMES: On completion of the course, the students will be able to:		Bloom's Taxonomy Mapped
CO1	Determine the tensile strength of materials	K3
CO2	Obtain bending properties of structural materials	K3
CO3	Determine the hardness properties of the materials	K3
CO4	Predict the compressive strength of the materials	K3