



PRAGATI ENGINEERING COLLEGE: SURAMPALEM

(Autonomous)

Department of Civil Engineering

R23

COURSE STRUCTURE

II YEAR I SEMESTER

Sl. No	Category	Course Code	Course Title	L	T	P	Credits
1	BS&H	23BM301T	Numerical Techniques And Statistical Methods	3	0	0	3
2	HSMC	23HM301T	Universal human values – understanding harmony and Ethical human conduct	2	1	0	3
3	Engineering Science	23CE301T	Surveying	3	0	0	3
4	Professional Core	23CE302T	Strength of Materials	3	0	0	3
5	Professional Core	23CE303T	Fluid Mechanics	3	0	0	3
6	Professional Core	23CE301P	Surveying Laboratory	0	0	3	1.5
7	Professional Core	23CE302P	Strength of Materials Laboratory	0	0	3	1.5
8	Skill Enhancement Course	23CE301S	Building Planning and Drawing	0	1	2	2
Total				14	2	8	20
9	Audit Course	23BC301T	Environmental Science	2	0	0	-

II YEAR II SEMESTER

Sl. No	Category	Course Code	Course Title	L	T	P	Credits
1	Management Course-I	23HM401T	Managerial Economics and Financial Analysis	2	0	0	2
2	Engineering Science / Basic Science	23CE401T	Engineering Geology	3	0	0	3
3	Professional Core	23CE402T	Concrete Technology	3	0	0	3
4	Professional Core	23CE403T	Structural Analysis	3	0	0	3
5	Professional Core	23CE404T	Hydraulics & Hydraulic Machinery	3	0	0	3
6	Professional Core	23CE402P	Concrete Technology Laboratory	0	0	3	1.5
7	Professional Core	23CE401P	Engineering Geology Laboratory	0	0	3	1.5
8	Skill Enhancement course	23CE401S	Remote Sensing & Geographical Information Systems	0	1	2	2
9	Engineering Science	23HM401P	Design Thinking & Innovation	1	0	2	2
Total				15	1	10	21
10	Mandatory course	23CE405T	Building materials and Construction	3	0	0	-
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation							



COURSE CONTENT

UNIT I

Iterative Methods:

Introduction – Solutions of algebraic and transcendental equations : Bisection method–Secant method –Method of false position–Iteration method–Newton-Raphson method (One variable and simultaneous Equations)

Interpolation : Newton’s forward and backward formulae for interpolation–Interpolation with unequal intervals – Lagrange’s interpolation formula

UNIT II

Numerical integration, Solution of ordinary differential equations with initial conditions:

Trapezoidal rule– Simpson’s $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule– Solution of initial value problems by Taylor’s series– Picard’s method of successive approximations– Euler’s method –Runge - Kutta method (second and fourth order) –Milne’s Predictor and Corrector Method.

UNIT III

Probability and Distributions:

Baye’s theorem – Random variables – Discrete and Continuous random variables–Distribution functions–Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance–Binomial, Poisson, Uniform and Normal distributions.

UNIT IV

Sampling Theory:

Introduction – Population and Samples – Sampling distribution of Means and Variance (definition only) –Point and Interval estimations – Maximum error of estimate – Central limit theorem (without proof) – Estimation using t, χ^2 and F-distributions.

UNIT V

Tests of Hypothesis:

Introduction – Hypothesis– Null and Alternative Hypothesis– Type I and Type II errors –Level of significance– One tail and two-tail tests – Test of significance for large samples and Small Samples: Single and difference means – Single and two proportions – Student’s t- test, F-test, χ^2 -test.

TEXT BOOKS

1. **B.S.Grewal**, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. **Miller and Freund’s**, Probability and Statistics for Engineers, 7/e, Pearson, 2008.

REFERENCE BOOKS

1. **Steven C.Chapra**, Applied Numerical Methods with MATLAB for Engineering and science, Tata Mc.Graw Hill Education.
2. **M.K.Jain, S.R.K.Iyengar and R.K.Jain**, Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
3. **Lawrence Turyn**, Advanced Engineering Mathematics, CRC Press.
4. **S.C.Gupta and V.K.Kapoor**, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.
5. **Shron L.Myers, KeyingYe, Ronald EWalpole**, Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
6. **Jayl.Devore**, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.

WEB RESOURCES

1. https://en.wikibooks.org/wiki/Numerical_Methods/Equation_Solving
2. https://en.wikipedia.org/wiki/Numerical_integration
3. https://en.wikipedia.org/wiki/Probability_distribution
4. [https://en.wikipedia.org/wiki/Sampling_\(statistics\)](https://en.wikipedia.org/wiki/Sampling_(statistics))
5. https://en.wikipedia.org/wiki/Statistical_hypothesis_test



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II Year I Semester

UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY

and ETHICAL HUMAN CONDUCT

(Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and CSE(CYBER SECURITY))

Course Category	HSMC	Course Code	23HM301T
Course Type	Theory	L-T-P-C	2-1-0-3
Prerequisites		Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Blooms Taxonomy Level
CO1	Understand the significance of value inputs in a classroom and start applying them in their life and profession	K1
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.	K2
CO3	Understand the role of a human being in ensuring harmony in Family And Society.	K1
CO4	Appraise the role of a human being in ensuring harmony in Nature/Existence.	K2
CO5	Distinguish between ethical and unethical practices to actualize a harmonious environment wherever they work.	K2

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3						
CO2						3			3	3		3
CO3						3		2				3
CO4						3	3					
CO5						3		3				



COURSE CONTENT

UNIT – I Introduction to Value Education: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, self-exploration as the Process for Value Education, Continuous Happiness and Prosperity-the basic human aspirations, Happiness and Prosperity- Current Scenario, Method to Fulfill the Basic Human Aspirations.

Practice Sessions: PS1 Sharing about Oneself , PS2 Exploring Human Consciousness, PS3 Exploring Natural Acceptance

UNIT – II Harmony in Human Being: Understanding Human being as the Co-existence of the self and the body, Distinguishing between the Needs of the self and the body, The body as an Instrument of the self, Understanding Harmony in the self, Harmony of the self with the body, Programme to ensure self - regulation and Health

Practice Sessions: PS4 Exploring the difference of Needs of self and body, PS5 Exploring Sources of Imagination in the self, PS6 Exploring Harmony of self with the body

UNIT – III Harmony in the Family and Society: Harmony in the family - the Basic Unit of Human Interaction, 'Trust' - the Foundational Value in Relationship, 'Respect' - as the Right Evaluation, Other Feelings, Justice in Human – to - Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

Practice Sessions: PS7 Exploring the Feeling of Trust, PS8 Exploring the Feeling of Respect, PS9 Exploring Systems to fulfil Human Goal

UNIT – IV Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual fulfillment among the Four Orders of Nature, Realizing Existence as Co- existence at All Levels, The Holistic Perception of Harmony in Existence

Practice Sessions: PS10 Exploring the Four Orders of Nature, PS11 Exploring Co-existence in Existence

UNIT – V Implications of the Holistic Understanding - a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value- based Life and Profession.

Practice Sessions: PS12 Exploring Ethical Human Conduct, PS13 Exploring Humanistic Models in Education, PS14 Exploring Steps of Transition towards Universal Human Order

Text books and Teachers Manual

1. A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1 - R R Gaur, R Asthana, G P Bagaria
2. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2 - R R Gaur, R Asthana, G P Bagaria



Reference Books

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth- by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal

Web References:

1. <https://fdp-si.aicte-india.org>
2. https://www.youtube.com/playlist?list=PLWDeKF97v9SP_Kt6jqzA3pZ3yA7g_OAQz



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II Year – I Semester SURVEYING

Course Category	Engineering Science	Course Code	23CE301T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Objectives:

1.	Know the principle and methods of surveying and measuring of horizontal and vertical- distances and angles
2.	Identification of source of errors, rectification methods and surveying principles to determine areas and volumes
3.	Know surveying principles to determine areas and volumes
4.	Setting out curves and use modern surveying equipments for accurate results
5.	Know the basics of Photogrammetric Surveying

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO 1	Illustrate the fundamentals in linear and compass survey	K2
CO 2	Identify the source of errors and rectification methods	K2
CO 3	Apply surveying principles to determine areas and volumes	K3
CO 4	Ability to set out curves and utilize modern surveying equipment.	K3
CO 5	Apply the basics of Photogrammetry Surveying in field	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	2	1	3	-	3	3	3	-	1	1	1	-
CO2	3	2	-	2	2	2	-	2	2	2	-	2	2	1	-
CO3	3	1	-	1	1	1	-	1	2	2	-	2	3	1	1
CO4	3	3	-	3	3	1	-	1	1	1	-	2	1	2	1
CO5	3	1	-	3	3	1	-	1	1	1	-	2	3	2	1



COURSE CONTENT

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Surveying accessories. Introduction to Compass, leveling and Plane table surveying.

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip – systems and W.C.B and Q.B systems of locating bearings.

UNIT - II

Leveling- Types of levels, methods of levelling, and Determination of levels, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, methods of contour surveying.

Areas - Determination of areas consisting of irregular boundary and regular boundary.

Volumes - Determination of volume of earth work in cutting and embankments for level section, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical leveling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Introduction to Omitted measurements.

UNIT - IV

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves. Introduction to Tacheometric Surveying.

Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station- advantages and Applications. Introduction to Global Positioning System. Introduction to Drone survey and LiDAR Survey(Light Detection And Ranging).

UNIT - V

Photogrammetry Surveying:

Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo-plotting instruments, mosaics, map substitutes.



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Text Books:

1. Surveying (Vol – 1 & 2) by Duggal S K, Tata McGraw Hill Publishing Co.Ltd. New Delhi, 5th edition, 2019.
2. Textbook of Surveying by C Venkatramaiah , Universities Press 1st Edition, 2011.

Reference Books:

1. Surveying (Vol – 1), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) ltd., New Delhi, 18th edition 2024.
2. Surveying (Vol – 2), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) ltd., New Delhi 17th 2022.
3. Surveying (Vol – 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) ltd., New Delhi 16th 2023.
4. Plane Surveying and Higher Surveying by Chandra A M, New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition, 2015.
5. Surveying and Levelling by N.Basak Tata McGraw Hill Publishing Co. Ltd. New Delhi, 4th edition, 2014.
6. Surveying (Vol 1, 2 & 3), by Arora K R, Standard Book House, Delhi. Edition: 12th, 2015.

Web Resources:

https://koha.srmap.edu.in/cgi-bin/koha/opac-detail.pl?biblionumber=11522&shelfbrowse_itemnumber=23066



PRAGATI ENGINEERING COLLEGE: SURAMPALEM

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Department of Civil Engineering

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II Year – I Semester STRENGTH OF MATERIALS

Course Category	Professional Core	Course Code	23CE302T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Learning Objectives:

1.	To impart Fundamental concepts of Strength of Material and Principles of Elasticity and Plasticity Stress
2.	To impart concepts of shear force and bending moment on various types of beams and loading conditions
3.	To impart concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections.
4.	To the concepts above will be utilized in measuring deflections in beams under various loading and support conditions.
5.	To classify cylinders and columns based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO 1	Recognize the basic materials behavior under the influence of different external loading conditions and the support conditions.	K2
CO 2	Draw the diagrams indicating the variation of the key performance features like axial forces, bending moment and shear forces in structural members.	K2
CO 3	Acquire knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams	K2
CO 4	Analyze the deflections due to various loading conditions.	K4
CO 5	Assess stresses across section of the thin, thick cylinders and columns to arrive at optimum sections to withstand the internal pressure using Lamé's equation	K4

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	-	-	-	-	-	2	1	3	3	1	1
CO2	2	1	-	1	-	-	-	-	-	1	1	2	3	1	1
CO3	2	2	-	1	-	-	-	-	-	2	1	2	3	2	1
CO4	1	2	-	1	-	-	-	-	-	2	1	1	3	2	1
CO5	2	1	-	2	-	-	-	-	-	1	1	2	3	2	1



COURSE CONTENT

UNIT — I:

Simple Stresses and Strains: Elasticity and plasticity — Types of stresses and strains — Hooke's law — Factor of safety, Poisson's ratio - Relationship between Elastic constants — Bars of varying section — stresses in composite bars.

UNIT — II:

Shear Force and Bending Moment: Definition of beam — Types of beams — Concept of shear force and bending moment — Point of contra flexure — Relation between S.F., B.M and rate of loading at a section of a beam; S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.

UNIT — III:

Flexural and Shear Stresses:

Flexural Stresses: Theory of simple bending — Assumptions — Derivation of bending equation, Neutral axis — Determination of bending stresses — section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections — Design of simple beams

Shear Stresses: Derivation of formula — Shear stress distribution across various beam sections like rectangular, circular, I, T Angle sections.

Torsion – circular shafts only.

UNIT — IV:

Deflection of Beams: Double integration and Macaulay's methods — Determination of slope and deflection for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads. Mohr's theorems — Moment area method — application to simple cases of cantilever.

UNIT — V:

Introduction – Classification of columns – Axially loaded compression members – Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Eccentric loading and Secant formula – Prof. Perry's formula.

Thin and Thick cylindrical shells — Derivation of formula for longitudinal and circumferential stresses — hoop, longitudinal and volumetric strains — changes in diameter, and volume of thin cylinders. Lames theory for thick cylinders, Derivation of Lames formulae, distribution of hoop and radial stresses across the thickness, compound cylinders- distribution of stresses



TEXTBOOKS:

1. Strength of Materials by R. K. Bansal, Lakshmi Publications, 16th Edition, 2022.
2. Strength of Materials by B. S. Basavarajaiah and P. Mahadevappa, Universities Press 3rd Edition, 2010
3. Strength of Materials by J.K. Gupta and S.K. Gupta, Cengage publications 2nd edition, 2024

REFERENCES:

1. Advanced Mechanics of Solids, L.S Srinath, McGraw Hill Education, 2017, 3rd Edition
2. Strength of Materials - Fundamentals and Applications, T.D.Gunneswara Rao and Mudim by Andal, Cambridge University Press, 2018, 1st Edition.
3. Mechanics of Materials, Beer and Johnston, McGraw Hill India Pvt. Ltd., 2020, 8th Edition (SI Units).
4. Mechanics of Solids — E P Popov, Prentice Hall, 2nd Edition, 2015.
5. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi 7th edition 2022.
6. Strength of Materials by S.S.Ratan Tata McGrill Publications 3rd Edition , 2016.

Web Resources:

1. <https://rb.gy/k17kns>
2. <https://rb.gy/yiyyip>



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II Year – I Semester FLUID MECHANICS

Course Category	Professional Core	Course Code	23CE303T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Objectives:

1.	To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
2.	To impart ability to solve engineering problems in fluid mechanics
3.	To enable the students measure quantities of fluid flowing in pipes, tanks and channels
4.	To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
5.	To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Identify the principles of fluid statics, kinematics and dynamics	K2
CO2	Apply the laws of fluid statics and concepts of buoyancy	K3
CO3	Recognize the fundamentals of fluid kinematics and differentiate types of fluid flows	K2
CO4	Apply the Principle of conservation of energy for flow measurement.	K3
CO5	Analyse the losses in pipes and discharge through pipe network.	K4

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	2	-	-	1	-	1	1	3	1	1
CO2	3	3	-	-	-	2	-	-	3	-	3	3	3	1	1
CO3	3	1	-	-	-	3	-	-	1	-	1	1	3	2	2
CO4	3	2	-	-	-	1	-	-	2	-	2	2	3	2	2
CO5	3	3	-	-	-	2	-	-	3	-	3	3	3	2	2



COURSE CONTENT

UNIT - I

Basic concepts and definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; Variation of viscosity with temperature, Newton law of viscosity; Vapor pressure, Boiling point, Surface tension, Capillarity, Bulk modulus of elasticity, Compressibility

UNIT – II

Fluid statics: Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies

UNIT - III

Fluid kinematics:

Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three - Dimensional continuity equations in Cartesian coordinates.

UNIT - IV

Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – Derivation; Energy Principle; Practical applications of Bernoulli's equation : Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

UNIT - V

Analysis Of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series.

Textbooks:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House.
2. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2nd edition 2018



Reference Books:

1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
2. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
3. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition, 2022.
4. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
5. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty Tata McGraw Hill, 3rd edition 2011

Online Learning Resources:

1. <https://archive.nptel.ac.in/courses/112/105/112105269/>
2. <https://nptel.ac.in/courses/112104118>
3. <https://nptel.ac.in/courses/105103192>



**II YEAR I SEM
SURVEYING LAB**

Course Category	Professional Core	Course Code	23CE301P
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Objectives: By the end of this course student will be able to	
1.	Know about various linear and angular measuring instruments
2.	Take Measurements in the linear and angular view
3.	Determine the area and volume by interpreting the data obtained from surveying activities
4.	Know modern equipment such as total station
5.	Draft field notes from survey data

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Handle various linear and angular measuring instruments	K3
CO2	Measure the linear and angular measurements	K3
CO3	Calculate the area and volume by interpreting the data obtained from surveying activities	K2
CO4	Handle modern equipment such as total station	K3
CO5	Prepare field notes from survey data	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes :															
(1 – Low, 2 - Medium, 3 – High)															
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	-	2	1	-	-	-	3	2	2	2	2	-	-
CO 2	2	2	-	2	1	-	-	-	3	3	3	2	2	-	-
CO 3	2	2	-	2	1	-	-	-	3	2	2	2	2	-	-
CO 4	1	2			3				3	2	2	1	1		1
CO 5	2	1			-				3	2	2	1	1		1



List of Field Works:

1. Chain survey of road profile with offsets in case of road widening.
2. Determination of distance between two inaccessible points by using compass.
3. Plane table survey ;finding the area of a given boundary by the method of Radiation
4. Fly levelling : Height of the instrument method (differential leveling)
5. Fly levelling: rise and fall method.
6. Theodolite survey: determining the horizontal and vertical angles by the method of repetition method
7. Theodolite survey: finding the distance between two in accessible points.
8. Theodolite survey: finding the height of far object.
9. Determination of area perimeter using total station.
10. Determination of distance between two inaccessible point by using total station.
11. Setting out a curve
12. Determining the levels of contours.

Note: Any 10 experiments are to be conducted among

TEXT BOOKS

1. Surveying (Vol No.1, 2 &3) by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd, New Delhi.
2. Text book of Surveying by C. Venkataramaiah, University Press, India (P) Limited.

REFERENCE BOOKS

1. Text book of Surveying by S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2. Text book of Surveying by Arora (Vol No. 1&2), Standard Book House, Delhi.
3. Advance Surveying by Satish Gopi, R. Sathi Kumar and N. Madhu, Pearson Publications.

WEB RESOURCES

1. <https://lecturenotes.in/notes/2827-note-for-surveying-1-s-1-by-swadhina-priyadarsini>
2. <https://nptel.ac.in/courses/105107122/1>
3. <https://nptel.ac.in/courses/105107158>



**II YEAR I SEM
STRENGTH OF MATERIALS LAB**

Course Category	Professional Core	Course Code	23CE302P
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course objectives: By the end of this course student will be able	
1.	To determine the tensile strength and yield parameters of mild steel
2.	To find out flexural strengths of Steel/Wood specimens and measure deflections
3.	To determine the torsion parameters of mild steel bar
4.	To determine the hardness numbers, impact and shear strengths of metals.
5.	To determine the load-deflection parameters for springs

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Conduct tensile strength test and draw stress-strain diagrams for ductile metals	K2
CO2	Perform bending test and determine load-deflection curve of steel/wood	K3
CO3	Able to conduct torsion test and determine torsion parameters	K2
CO4	Perform hardness, impact and shear strength tests and calculate hardness numbers, impact and shear strengths	K3
CO5	Tests on closely coiled and open coiled springs and calculate deflections	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

**Contribution of Course Outcomes towards achievement of Program Outcomes :
(1 – Low, 2 - Medium, 3 – High)**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	-	2	1	-	-	-	3	2	2	2	2	-	-
CO 2	2	2	-	2	1	-	-	-	3	3	3	2	2	-	-
CO 3	2	2	-	2	1	-	-	-	3	2	2	2	2	-	-
CO 4	1	2			3				3	2	2	1	1		-
CO 5	2	1			-				3	2	2	1	1		-



LIST OF EXPERIMENTS:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
6. Hardness test.
7. Compression test on Open coiled springs
8. Tension test on Closely coiled springs
9. Compression test on wood/ concrete
10. Izod / Charpy Impact test on metals
11. Shear test on metals
12. Use of electrical resistance strain gauges.
13. Continuous beam – deflection test.

TEXT BOOKS

1. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi
2. Strength of Materials by B.S.Basavarajiah and P. Mahadevappa, 3rd Edition, Universities Press.

REFERENCE BOOKS

1. Fundamentals of Solid Mechanics M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi.
2. Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.

WEB RESOURCES

1. www.nptel.ac.in/courses
2. <https://theconstructor.org>



**II YEAR I SEM
BUILDING PLANNING AND DRAWING**

Course Category	Skill Enhancement Course	Course Code	23CE301S
Course Type		L-T-P-C	0-1-2-2
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Objectives:

1.	Initiating the student to different building bye-laws and regulations.
2.	Imparting the planning aspects of residential buildings and public buildings.
3.	Giving training exercises on various signs and bonds.
4.	Giving training exercises on different building units.
5.	Imparting the skills and methods of planning of various buildings.

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Plan various buildings as per the building by-laws.	K3
CO2	Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.	K3
CO3	Draw signs and bonds	K2
CO4	Draw different building units	K3
CO5	Learn the skills of drawing building elements and plan the buildings as per requirements	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

**Contribution of Course Outcomes towards achievement of Program Outcomes :
(1 – Low, 2 - Medium, 3 – High)**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	-	-	3	3	2	-	2	2	2	3	-	2
CO2	1	1	2	-	-	3	2	-	-	2	1	1	-	-	-
CO3	1	1	2	-	-	3	3	2	-	2	2	2	3	1	1
CO4	1	1	2	-	-	3	3	2	-	2	2	2	3	1	1
CO5	1	1	2	-	-	3	3	2	-	2	2	2	3	1	1



Syllabus:

1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Detailing & Drawing of Doors.
5. Detailing & Drawing of Windows.
6. Detailing & Drawing of Ventilators & Roofs.
7. Drawing of Line Diagram of Residential Buildings by using Building Bye- Laws.
8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.
9. Drawing of Plan, Elevation & Section for Hospital Building.
10. Drawing of Plan, Elevation & Section for Industrial Building.

Text Books:

1. Planning, designing and Scheduling, Gurcharan Singh and Jagdish Singh
2. Building planning and drawing by M. Chakraborti.
3. Building drawing, M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, NewDelhi.

Reference Books:

1. National Building Code 2016 (Volume- I & II).
2. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.
3. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, New Delhi.
4. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai
5. Building Materials and Construction, G. C Saha and Joy Gopal Jana, McGrawHill Education (P)India Ltd. New Delhi.



COURSE CONTENT

Unit – I

Managerial Economics: Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

Unit – II

Production and Cost Analysis: Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

Unit – III

Business Organizations and Markets: Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic - Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

Unit – IV

Capital Budgeting: Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects - Pay Back Period Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

Unit – V

Financial Accounting and Analysis: Introduction - Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books :

1. Suma Damodaran - Managerial Economics - Oxford - 2011.
2. Vanitha Agarwal - Managerial Economics - Pearson Publications- 2011.
3. V. Maheswari - Financial Accounting- Vikas Publications - 2018
4. S. A. Siddiqui & A. S. Siddiqui - Managerial Economics and Financial Analysis - New Age International Publishers – 2012

Web References: <https://www.slideshare.net/123ps/managerial-economics-ppt>

<https://www.slideshare.net/rossanz/production-and-cost-45827016>

<https://www.slideshare.net/darkyla/business-organizations-19917607>

<https://www.slideshare.net/balarajbl/market-and-classification-of-market>

<https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396>

<https://www.slideshare.net/ashu1983/financial-accounting>



**II Year II Semester
ENGINEERING GEOLOGY**

Course Category	Engineering Science	Course Code	23CE401T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Objectives:	
1.	To know the importance of Engineering Geology to the Civil Engineering.
2.	To enable the students understand what minerals and rocks are and their formation and identification.
3.	To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures.
4.	To enable the student realize its importance and applications of Engineering Geology in Civil Engineering constructions.
5.	Concepts of Groundwater and its geophysical methods.

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Classify the significance of geological agents on Earth surface and its significance in Civil Engineering	K2
CO2	Identify and understand the properties of Minerals and Rocks.	K3
CO3	Identify the concepts of Groundwater and its geophysical methods.	K2
CO4	Classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard zonation.	K3
CO5	Investigate the project site for mega/mini civil engineering projects and site selection for mega engineering projects like Dams, Reservoirs and Tunnels.	K4

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes :															
(1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	1	2	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	3	3	2	3	-	2	-	-	-	2	2	2	2	-
CO5	3	3	2	2	3	-	2	-	-	-	2	2	2	2	-



COURSE CONTENT

UNIT-I:

Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies, Weathering of rocks, Geological agents, weathering process of Rock, Rivers and geological work of rivers.

UNIT-II

Mineralogy And Petrology: Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for megascopic study for the following minerals and rocks. Common rock forming minerals: Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

UNIT-III

Structural Geology: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

UNIT-IV

Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes and Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic belts, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

UNIT-V

Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful constructions of reservoirs, Life of Reservoirs. Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.



TEXT BOOKS:

1. Engineering Geology by N. ChennaKesavulu, Laxmi Publications . 2ndEdn 2014.
2. Engineering & General Geology by Parbin Singh Katson educational series 8th 2023

REFERENCES:

1. Engineering Geology by SubinoyGangopadhyay Oxford University press 1st edition, 2012.
2. Engineering Geology by D. Venkat Reddy, Vikas Publishing, 2ndEdn , 2017,
3. Geology for Engineers and Environmental Society' Alan E Kehew, 3rd edn., 2013) Pearson publications.
4. Environmental Geology' (2013) K.S.Valdiya, 2nd ed., McGraw Hill Publications.

Web Materials:

1. <https://www.classcentral.com>
2. <https://www.poriyaan.in>
3. <https://www.academia.edu>



**II Year II Semester
CONCRETE TECHNOLOGY**

Course Category	Professional Core	Course Code	23CE402T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Objectives

Upon successful completion of this course, the student will be able to

1.	Learn materials and their properties used in the production of concrete
2.	Learn the behavior of concrete at fresh stage
3.	Learn the behavior of concrete at hardened stage
4.	Learn the influence of elasticity, creep and shrinkage on concrete
5.	Learn the mix design methodology and special concretes

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	explain the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.	K2
CO2	Test the fresh concrete properties and the hardened concrete properties. Understand the basic concepts of concrete. Design the concrete mix by BIS method.	K3
CO3	Evaluate the ingredients of concrete through lab test results. Realize the importance of quality of concrete.	K5
CO4	Understand the behaviour of concrete in various environments.	K3
CO5	explore the basic concepts of special concrete and their production and applications.	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

**Contribution of Course Outcomes towards achievement of Program Outcomes :
(1 – Low, 2 - Medium, 3 – High)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	-	-	-	-	-	2	1	3	3	1	1
CO2	2	1	-	1	-	-	-	-	-	1	1	2	3	1	1
CO3	2	2	-	1	-	-	-	-	-	2	1	2	3	2	1
CO4	1	2	-	1	-	-	-	-	-	2	1	1	3	2	1
CO5	2	1	-	2	-	-	-	-	-	1	1	2	3	2	1



COURSE CONTENT

UNIT- I CEMENTS: Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substances – Soundness – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates Maximum aggregate size- Quality of mixing water

UNIT- II FRESH CONCRETE: Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Ready mixed concrete, Shotcrete

UNIT- III HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gel/space ratio - Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete:Compression test – Tension test – Factors affecting strength – Flexure test –Splitting test – Non-destructive testing methods – Codal provisions for NDT.

UNIT- IV ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage –types of shrinkage.

UNIT- V MIX DESIGN AND SPECIAL CONCRETES: Ready mixed concrete, Fibre reinforced concrete – Different types of fibres – Factors affecting properties of FRC, High performance concrete – Self consolidating concrete, Self healing concrete.

Factors in the choice of mix proportions –Quality control of concrete- Statistical methods- Acceptance Criteria-Concepts Proportioning of concrete mixes by ACI method and IS Code method

TEXT BOOKS

1. Properties of Concrete by A.M. Neville – PEARSON – 4th edition
2. Concrete Technology by M.L. Gambhir. – Tata Mc.Graw Hill Publishers, New Delhi 5th edition 2013.
3. Concrete Technology by Job Thomas, Cengage Publications, 1st edition, 2015.

References

1. Concrete Microstructure, Properties of Materials by P.K. Mehta and Moterio. McGraw Hill 4th edition 2014
2. Concrete Technology, J.J. Brooks and A. M. Neville, Pearson, 2019, 2nd Edition.
3. Concrete Technology by M. S. Shetty. – S. Chand & Co.; 2004
4. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi.

Web Materials:

1. <https://rb.gy/3r3dl0>



**II Year – II Semester
STRUCTURAL ANALYSIS**

Course Category	Professional Core	Course Code	23CE403T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Learning Objectives	
Upon successful completion of this course, the student will be able to	
1.	Analysis of fixed and continuous beams
2.	Learn the analysis of indeterminate structures
3.	Learn about slope-deflection method
4.	Learn about Moment – distribution method
5.	Learn energy theorems

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Analysis of fixed and continuous beams Apply energy theorems to analyze trusses	K3
CO2	Analyze indeterminate structures by using Castigliano’s-II theorem	K4
CO3	Analyze continuous beams and portal frames by using slope-deflection method	K4
CO4	Analyze continuous beams and portal frames by using Moment – distribution method	K4
CO5	Apply energy theorems to analyze trusses	K4

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes :
(1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	-	-	-	-	-	2	1	3	3	1	1
CO2	2	1	-	1	-	-	-	-	-	1	1	2	3	1	1
CO3	2	2	-	1	-	-	-	-	-	2	1	2	3	2	1
CO4	1	2	-	1	-	-	-	-	-	2	1	1	3	2	1
CO5	2	1	-	2	-	-	-	-	-	1	1	2	3	2	1



COURSE CONTENT

UNIT – I

FIXED BEAMS & CONTINUOUS BEAMS : Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of pointloads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT - II

ANALYSIS OF INDETERMINATE STRUCTURES: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano's-II theorem.

UNIT - III

SLOPE-DEFLECTION METHOD: Introduction-derivation of slope deflection equations-application to continuous beams with and without settlement of supports - Analysis of single bay portal frames without sway.

UNIT - IV

MOMENT DISTRIBUTION METHOD: Introduction to moment distribution method-Application to continuous beams with and without settlement of supports-Analysis of single bay storey portal frames without sway.

UNIT – V

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem Deflections of simple beams and pin jointed trusses.

Textbooks:

1. Analysis of Structures – Vol-I&II by V.N.Vazirani &M.M.Ratwani, KhannaPublications, New Delhi.
2. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers. 3rd edition2017.

Reference Books:

1. Structural analysis by Aslam Kassimali Cengage publications 6th edition 2020.
2. Structural analysis Vol.I and II by Dr.R.Vaidyanathan and Dr.PPerumal– Laxmi publications. 3rd 2016.
3. Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
4. Structural Analysis – D.S.Prakasarao -Univeristy press.
5. Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, New Delhi.

Web Materials:

1. <https://rb.gy/3od4w0>
2. <https://rb.gy/c5rjv0>



**II Year II Semester
HYDRAULICS AND HYRAULIC MACHINERY**

Course Category	Professional Core	Course Code	23CE404T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Fluid Mechanics	Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Objectives:	
1.	To Introduce concepts of laminar and turbulent flows
2.	To teach principles of uniform flows through open channel.
3.	To teach principles of non-uniform flows through open channel.
4.	To impart knowledge on design of turbines.
5.	To impart knowledge on design of pumps

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Explore the characteristics of laminar and turbulent flows.	K2
CO2	Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels.	K3
CO3	Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows.	K3
CO4	Evaluate the performance of impact of jets on plates and design Pelton wheel, Francis and Kaplan turbine	K5
CO5	Identify the principles, losses and its efficiencies of centrifugal pumps	K2

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes :

(1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	2	-	-	-	-	2	-	3	1	1
CO2	3	3	-	-	-	3	-	-	-	-	3	-	3	1	1
CO3	3	3	-	-	-	3	-	-	-	-	3	-	3	1	1
CO4	3	3	-	-	-	3	-	-	-	-	3	-	3	2	2
CO5	3	2	-	-	-	2	-	-	-	-	2	-	3	2	2



COURSE CONTENT

UNIT – I

Laminar & Turbulent flow in pipes: Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody's diagram – Introduction to boundary layer theory.

UNIT - II

Uniform flow in Open Channels: Open Channel Flow - Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Hydraulically efficient channel sections: Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factors

UNIT - III

Non-Uniform flow in Open Channels: Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy dissipation.

UNIT - IV

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Velocity triangles at inlet and outlet - Work done and efficiency Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design - efficiency - Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation: causes and effects.

UNIT – V

Pumps: Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies

TEXT BOOKS: -

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House 22nd, 2019.
2. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2nd edition 2018

Reference Books:

1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
2. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition, 2022.
3. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
4. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty 3rd edition 2011

Online Learning Resources:

1. <https://nptel.ac.in/courses/105105203>
2. <https://archive.nptel.ac.in/courses/112/106/112106300/>
3. <https://archive.nptel.ac.in/courses/112/103/112103249/>



**II Year II Semester
CONCRETE TECHNOLOGY LABORATORY**

Course Category	Professional Core	Course Code	23CE402P
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Objectives

Upon successful completion of this course, the student will be able to

1. Test basic properties of ingredients of concrete fresh and hardened concrete properties

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Outline importance of testing cement and its properties	K2
CO2	Assess different properties of Aggregates	K3
CO3	Assess fresh concrete properties and their relevance to hardened concrete	K3
CO4	Assess hardened concrete properties	K5

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes :

(1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	-	-	-	-	-	2	1	3	3	1	1
CO2	2	1	-	1	-	-	-	-	-	1	1	2	3	1	1
CO3	2	2	-	1	-	-	-	-	-	2	1	2	3	2	1
CO4	1	2	-	1	-	-	-	-	-	2	1	1	3	2	1



Detailed Syllabus:

1. Tests on Cement

Normal Consistency and Fineness of cement.
Initial setting time and Final setting time of cement.
Specific gravity and soundness of cement.
Compressive strength of cement.

2. Tests on Fine Aggregates

Grading and fineness modulus of Fine aggregate by sieve analysis.
Specific gravity of fine aggregate
Water absorption and Bulking of sand

3. Tests on Coarse Aggregates

Grading of Coarse aggregate by sieve analysis.
Specific gravity of coarse aggregate.
Water absorption of Coarse aggregates.

4. Tests on fresh Concrete

Workability of concrete by compaction factor method
Workability of concrete by slump test
Workability of concrete by Vee-bee test.

5. Tests on Hardened Concrete

Compressive strength of cement concrete and Modulus of rupture
Young's Modulus and Poisson's Ratio
Split tensile strength of concrete.
Non-Destructive testing on concrete (for demonstration)

TEXT BOOKS

1. Concrete Technology by M.S. Shetty – S. Chand & Co.
2. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons

REFERENCE BOOKS

1. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons
2. Highway Material Testing manual, Khanna, Justo and Veeraraghavan, Nemchand Brothers



LIST OF EXPERIMENTS

1. Physical properties of minerals: Mega-scopic identification of
 - a) Rock forming minerals – Quartz group, Feldspar group, Garnet group, Micagroup & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc...
 - b) Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc...

2. Megascopic description and identification of rocks.
 - a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
 - b) Sedimentary rocks – Sand stone, Ferruginous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
 - c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite Biotiteschist, Marble, Khondalite, etc.

3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.

4. Simple Structural Geology problems.

5. Bore hole data

6. Strength of the rock using laboratory tests.

7. Field work – To identify Minerals, Rocks, Geomorphology & Structural Geology.

LAB EXAMINATION PATTERN:

1. Description and identification of FOUR minerals
2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
3. ONE Question on Interpretation of a Geological map along with a geological section.
4. TWO Questions on Simple strike and Dip problems.
5. Bore hole problems.
6. Project report on geology.

REFERENCES:

1. 'Applied Engineering Geology Practicals' by M T Mauthesha Reddy, New Age International Publishers, 2nd Edition.
2. 'Foundations of Engineering Geology' by Tony Waltham, Spon Press, 3rd edition, 2009.



**II Year II Semester
REMOTE SENSING AND GIS**

Course Category	Skill Enhancement Course	Course Code	23CE401S
Course Type		L-T-P-C	0-1-2-2
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Learning Objectives: The course is designed to	
1.	Introduce the basic principles of Remote Sensing and GIS techniques and its application to Civil Engineering.
2.	Learn various types of sensors and platforms and understand the principles of spatial analysis techniques in GIS.
3.	Introduce GIS software to understand the process of digitization, creation of thematic map from Topo sheets and maps.

Course outcomes

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Acquire knowledge about concepts of remote sensing, sensors and their characteristics	K2
CO2	Explore with data models and data structures to introduce various Raster and Vector Analysis capabilities in GIS.	K3
CO3	Digitize and create thematic map and extract important features to calculate geometry.	K3
CO4	Perform surface analysis over Contour to develop digital elevation model.	K3
CO5	Use GIS software to perform simple analysis in water resources and transportation engineering	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12	PSO1	PSO2	PSO3
CO 1	2		1	1			2					2	1		1
CO 2	2		1	1			2					2	1		1
CO 3	1	2	2	1	2	2	3		2	2	1	3	1		2
CO 4	1	2	2	1	2	2	3		2	2	1	3	2		2
CO 5	1	2	2	1	2	2	3		2	2	1	3	2		2



COURSE CONTENT

UNIT – I

Introduction to Remote sensing: History of Remote Sensing, Electromagnetic Radiation, Electromagnetic Spectrum, Energy Interaction with Atmosphere, Energy Interaction with the Earth Surfaces - Characteristics of Remote Sensing Systems, Sensor Resolutions, Advantages & Limitations - Platforms: Types of Sensors, Airborne Remote Sensing, Spaceborne Remote Sensing - IRS, LANDSAT, SPOT & Recent satellite.

UNIT – II

Digital Image analysis: Digital Image Characteristics, Digital Image Data Formats, Band Interleaved by Pixel (BIP), Band Interleaved by Line (BIL), Band Sequential (BSQ) - Visual Interpretation Elements, Preprocessing, Enhancement, Classification, Supervised classification, Unsupervised classification.

UNIT – III

Introduction to Geographic Information System: Principles, Components and Applications of GIS - Map projections, Spatial Data Structures, Raster and Vector Data Formats, Data Inputs, Data Manipulation, Data Retrieval, Data Analysis - Spatial data analysis: Overlay Function-Vector Overlay Operations, Raster Overlay Operations, Arithmetic Operators, Comparison and Logical Operators, Conditional Expressions - Network Analysis: Components of network, Transportation network - Optimum pathanalysis.

TEXT BOOKS:

1. BasudebBhatta (2021). 'Remote sensing and GIS', 3rdedn., Oxford University Press.
2. S. Kumar, (2016) 'Basics of Remote sensing & GIS', Laxmi Publications.
3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2022) 'Remote Sensing and Image Interpretation', 7thedn., Wiley India Pvt. Ltd.
4. Demers, M.N, (2013) 'Fundamentals of Geographic Information Systems', 4thedn., Wiley India Pvt. Ltd.

List of Experiments:

- Expt. 1 : Georeferencing a Toposheet or Map
- Expt. 2 : Digitization and Attribute table creation.
- Expt. 3 : Creation of Thematic Map
- Expt. 4 : Calculation of Feature geometry – Length, Area & Perimeter.
- Expt. 5 : Contour map – developing TIN & DEM from Contour.
- Expt. 6 : Stream network – Stream ordering map.
- Expt. 7 : Watershed - calculate Hydro-geomorphological parameters.
- Expt. 8 : Transportation Network Map – Route analysis.

GIS SOFTWARE: QGIS / ArcGIS

Textbook for Practical

1. QGIS User Guide
2. ArcGIS User Manual by ESRI

REFERENCES:

1. Schowengerdt, R. A (2006) 'Remote Sensing', Elsevier publishers.
2. Burrough P A and R.A. McDonnell, (1998) 'Principals of Geographical Information Systems', Oxford University Press.
3. George Joseph (2013) 'Fundamentals of Remote Sensing', Universities Press.

Web references:

1. <https://nptel.ac.in/courses/10510319>



**II Year II Semester
DESIGN THINKING & INNOVATION
(Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and
CSE(CYBER SECURITY))**

Course Category	BS&H	Course Code	23HM401P
Course Type	Theory	L-T-P-C	1 -0 -2-2
Prerequisites		Internal Assessment Semester End Examination Total Marks	30 70 100

Course Outcomes		Blooms Taxonomy Level
Upon successful completion of the course, the student will be able to		
CO 1	Define the concepts related to design thinking.	K1
CO 2	Explain the fundamentals of Design Thinking and innovation.	K2
CO 3	Apply the design thinking techniques for solving problems in various sectors.	K3
CO 4	Analyze to work in a multidisciplinary environment.	K4
CO 5	Evaluate the value of creativity.	K5

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3		1	3					1	1
CO2			3		2	3						
CO3		1	3			3			1			1
CO4			3			3						
CO5			3			3					3	2



COURSE CONTENT

UNIT – I Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT - II Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT - III Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT - IV Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modeling, how to set specifications, Explaining their own product design.

UNIT – V Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

Textbooks:

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

Web Resources:

- <https://nptel.ac.in/courses/110/106/110106124/>
- <https://nptel.ac.in/courses/109/104/109104109/>
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview



**II Year II Semester
BUILDING MATERIALS AND CONSTRUCTIONS**

Course Category	Mandatory Course	Course Code	23CE405T
Course Type		L-T-P-C	3-0-0-0
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Learning Objectives:	
The course is designed to	
1.	To develop the building walls and foundations and how they are useful for buildings.
2.	In these mainly we know about building arches, roofs, doors, windows and ventilators and how they are given for buildings.
3.	To develop the form work and finishing work which is used for buildings and to solve the defects of building properties which are able to know with material
4.	Painting is also taken for a beautiful looking structure for the good manner.
5.	These courses explain about the material which we want to use and how we want to use and how to give a good building for using purpose

Course outcomes

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Identify relevant type of construction materials for the given type of building.	K2
CO2	Use the relevant type of special purpose construction materials in the given situation.	K3
CO3	Undertake the given type of building construction activity for the given component of building structure.	K3
CO4	Design the relevant means of communication for the given building structure.	K3
CO5	Use the relevant type of material for finishing purpose in the given situation.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes :															
(1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12	PSO1	PSO2	PSO3
CO 1	2		1	1			2					2	1		1
CO 2	2		1	1			2					2	1		1
CO 3	1	2	2	1	2	2	3		2	2	1	3	1		2
CO 4	1	2	2	1	2	2	3		2	2	1	3	2		2
CO 5	1	2	2	1	2	2	3		2	2	1	3	2		2



COURSE CONTENT

UNIT I Masonry: Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls. **WOOD:** Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiber – Reinforced Plastics, Steel, Aluminium.

UNIT II: LIME AND CEMENT Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance – various tests for concrete.

UNIT III: BUILDING COMPONENTS Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

UNIT IV : FINISHINGS Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering – Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings.

UNIT V: AGGREGATES Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate Bulking of sand – Sieve analysis.

Text Books:

1. Building Materials by S.S. Bhavikatti, Vices publications House private ltd.
2. Building Construction by S.S. Bhavikatti, Vices publications House private ltd.
3. Building Materials by B.C. Punmia, Laxmi Publications private ltd.
4. Building Construction by B.C. Punmia, Laxmi Publications (p) ltd.

References:

1. Building Materials by S.K.Duggal, New Age International Publications.
2. Building Materials by P.C.Vergheese, PHI learning (P) ltd.
3. Building Materials by M.L.Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Building construction by P.C.Vergheese, PHI Learning (P) Ltd.