



DADI INSTITUTE OF ENGINEERING & TECHNOLOGY

An Autonomous Institute

Approved by A.I.C.T.E & Permanently affiliated to JNTU GV

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B. Tech (Regular-Full time)

(Civil Engineering)

(Effective for the students admitted into I year from the Academic Year **2023-24** onwards)

&

B.Tech.(Lateral Entry Scheme)

(Effective for the students admitted into II year through Lateral Entry Scheme from the Academic Year 2024 - 25 onwards)

Civil Engineering
B. Tech.–II Year I Semester

No.	Category	Title	L	T	P	Credits
1	BS	Numerical and Statistical Methods	3	0	0	3.0
2	HSMC	Universal Human Values–Understanding Harmony and Ethical Human Conduct	2	1	0	3.0
3	Engineering Science	Surveying	3	0	0	3.0
4	Professional Core	Strength of Materials	3	0	0	3.0
5	Professional Core	Fluid Mechanics	3	0	0	3.0
6	Professional Core	Surveying Lab	0	0	3	1.5
7	Professional Core	Strength of Materials Lab	0	0	3	1.5
8	Skill Enhancement Course	Soft skills	0	1	2	2.0
9	Audit Course	Environmental Science	2	0	0	-
Total			16	2	8	20.0

B. Tech. II Year II Semester

No.	Category	Title	L	T	P	Credits
1	Management Elective-I	Managerial Economics and Financial Analysis Business Environment Organizational Behavior	2	0	0	2.0
2	Engineering Science	Engineering Geology (Layered Learning)	2	0	2	3.0
3	Professional Core	Building Materials and Concrete Technology	3	0	0	3.0
4	Professional Core	Structural Analysis	3	0	0	3.0
5	Professional Core	Hydraulics and Hydraulic Machinery	3	0	0	3.0
6	Professional Core	Concrete Technology Lab	0	0	2	1.0
7	Professional Core	Engineering Geology Labss	0	0	4	2.0
8	Skill Enhancement course	Building Planning and Drawing	0	1	2	2.0
9	Engineering Science	Design Thinking and Innovation	1	0	2	2.0
Total			15	1	10	21.0

II – I Semester

L	T	P	C
3	0	0	3

NUMERICAL AND STATISTICAL METHODS

Course Outcomes:

After successful completion of this course, the students should be able to:

- Apply numerical methods to solve algebraic and transcendental equations.
- Derive interpolating polynomials using interpolation formulae.
- Solve differential and integral equations numerically.
- To identify real life problems into Mathematical Models.
- To apply the probability theory and testing of hypothesis in the field of civil engineering Applications.

Pre-requisite: Basic algebraic Equations, Probability, random variables (discrete and continuous) and probability distributions.

UNIT I: Solution of Algebraic & Transcendental Equations

Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method System of Algebraic equations: Gauss Elimination, Jacoby and Gauss Siedal method.

UNIT II: Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.

UNIT III: Solution of Initial value problems to Ordinary differential equations

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's and modified Euler's methods-Runge-Kutta methods (second and fourth order).

UNIT IV: Estimation and Testing of hypothesis, large sample tests

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

UNIT V: Small sample tests

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.

Textbooks:

1. S S Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017, 44th Edition
3. Miller and Freunds, Probability and Statistics for Engineers, 7/e, Pearson, 2008.India.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2018, 10th Edition.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Alpha ScienceInternational Ltd., 2021 5th Edition(9th reprint).
3. Ronald E. Walpole, Probability and Statistics for Engineers and Scientists, PNIE
4. H. K Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publications, 2014, Third Edition (Reprint 2021)

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc24_ma05/preview
<http://nptel.ac.in/courses/111105090>

II – I Semester

L	T	P	C
3	0	0	3

**UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND
ETHICAL HUMAN CONDUCT**

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes:

- Define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2)
- Identify one's self, and one's surroundings (family, society nature) (L1, L2)
- Apply what they have learnt to their own self in different day-to-day settings in real life (L3)
- Relate human values with human relationship and human society. (L4)
- Justify the need for universal human values and harmonious existence (L5)
- Develop as socially and ecologically responsible engineers (L3, L6)

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I

Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: self-exploration as the Process for Value Education

Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT II

Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

Lecture 7: Understanding Human being as the Co-existence of the self and the body.

Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.

Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self

Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III

Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV

Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)

Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

UNIT V

Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values

Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education

Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for

UNIT I – Introduction to Value Education

PS1 Sharing about Oneself

PS2 Exploring Human Consciousness

PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being

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

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

Readings:

Textbook and Teachers Manual

a. The Textbook

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

b. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria, *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

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, 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 – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending

on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

1. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf>
2. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf>
3. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf>
4. <https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%202023.pdf>
5. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf>
6. <https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf>
7. <https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf>
8. <https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385>
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

II B.Tech. I Semester

L	T	P	C
3	0	0	3

Surveying

Course Outcomes

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

Course Outcomes		RBT Level
CO 1	Utilize the principles & methods of surveying to measure horizontal & vertical distances and angles	L2
CO 2	Recognize the basic principles of compass surveying, such as traversing and calculating angles.	L3
CO 3	Diagnose sources of errors and implement rectification methods	L2
CO 4	Grasp the fundamentals of theodolite surveying, such as trigonometric leveling and traversing.	L3
CO 5	Set out curves and operate modern surveying equipment	L4

Unit 1

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Surveying accessories.. Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections. Plane Table Surveying: Introduction, Accessories, Working operations, Methods of plane tabling

Unit 2

Compass Survey: Introduction, Meridians, Azimuths and Bearings-Related problems, declination, computation of angle-related problems. Traversing-Purpose-types of traverse, Temporary adjustments of compass-Magnetic Declination-Related problems, Local attraction-Related Problems-Errors in compass survey

Unit 3

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 4

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 5

Tacheometric Surveying::Definition, Advantages of Tacheometric surveying , Principle of stadia measurements, Determination of constants K and C, Stadia and tangential methods of Tachometry. Distance and Elevation formulae for Staff vertical position.

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves.

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).

Textbooks:

1. Duggal S. K., Surveying (Vol. 1 & 2), Tata McGraw Hill Publishing Co. Ltd., New Delhi, 5th edition, 2019.
2. Subramanian,R, Surveying and Levelling, delhi: Standard book house.

Reference Books:

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

Web Resources:

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

II – I Semester
Strength of Materials

L	T	P	C
3	0	0	3

Course Outcomes

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

Course Outcomes		RBT Level
CO 1	Explain the basic materials' behavior under the influence of different external loading and support conditions.	L2
CO 2	Illustrate diagrams indicating the variation of key performance features like axial forces, bending moments, and shear forces in structural members.	L3
CO 3	Understand and calculate section modulus for determining stresses developed in beams.	L2
CO 4	Analyze deflections due to various loading conditions.	L3
CO 5	Evaluate stresses across sections of thin and thick cylinders and columns to determine optimum sections to withstand internal pressure using Lamé's equation.	L4

Unit 1

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 2

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 3

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 4

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 5

Torsion of Circular Shafts: Theory of pure torsion – Derivation of Torsion equation -Assumptions made in the theory of pure torsion – Polar section modulus – Power transmitted by shafts – Combined bending and torsion.

Columns and Cylindrical Shells: 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.

Textbooks

1. R. K. Bansal, Strength of Materials, Lakshmi Publications, 16th edition, 2022.
2. Rajput,R.K., Strength of Material New delhi: S.Chand & co,
3. Strength of materials Subramanian,R America Oxford University Press
4. Strength of Materials(Part-II) Stephen, Timoshenko, New Delhi CBS Publishers and Distrihbutors.

References

1. E. P. Popov, Mechanics of Solids, Prentice Hall, 2nd edition, 2015
2. R. K. Rajput, A Textbook of Strength of Materials (Mechanics of Solids, SI Units), S. Chand & Co., New Delhi, 7th edition, 2022

Online Modules

<https://archive.nptel.ac.in/courses/105/104/105104101/>

<https://nptel.ac.in/courses/105107122>

<http://www.digimat.in/nptel/courses/video/105104101/L04.html>

**II – I Semester
Fluid Mechanics**

L	T	P	C
3	0	0	3

Course Outcomes

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

Course Outcomes		RBT Level
CO 1	Explain the principles of fluid statics, kinematics, and dynamics.	L2
CO 2	Apply the laws of fluid statics and concepts of buoyancy.	L3
CO 3	Describe the fundamentals of fluid kinematics and differentiate between types of fluid flows.	L2
CO 4	Apply the principle of conservation of energy for flow measurement.	L3
CO 5	Analyze the losses in pipes and discharge through pipe networks.	L4

Unit 1

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 2

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 3

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 4

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 5

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.

Centrifugal-Pumps: Pump installation details-classification-work done- efficiencies-specific speed, multistage pumps-pumps in parallel and series - performance of pumps-characteristic curves- Cavitation.

Reciprocating Pumps: Introduction, classification, components, working, discharge, indicator diagram, work done and slip.

Textbooks:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House 22nd, 2019.
2. Hydraulics fluid mechanics and fluid machines 7th ed Ramamrutham, S, New delhi : dhan pat rai.

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. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty Tata McGraw Hill, 3rd edition 2011

Online Web sources

<https://archive.nptel.ac.in/courses/112/105/112105269/>

<https://nptel.ac.in/courses/112104118>

<https://nptel.ac.in/courses/105103192>

<https://archive.nptel.ac.in/courses/112/105/112105171/>

II – I Semester

L	T	P	C
0	0	3	1.5

Surveying Laboratory

Course Outcomes

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

Course Outcomes	
CO 1	Operate various linear and angular measuring instruments. (Apply)
CO 2	Record linear and angular measurements accurately. (Apply)
CO 3	Calculate area and volume by analyzing data obtained from surveying activities. (Analyze)
CO 4	Utilize modern equipment such as a total station. (Apply)
CO 5	Compile field notes from survey data. (Create)

List of Field Works:

1. Survey in an area by chain survey (Closed circuit).
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. Two Point Problem by the plane table survey.
5. Fly levelling: Height of the instrument method (differential leveling)
6. Fly levelling: rise and fall method.
7. Theodolite survey: determining the horizontal and vertical angles by the method of repetition method
8. Theodolite survey: finding the distance between two inaccessible points.
9. Theodolite survey: finding the height of far object.
10. Tachometric Survey: Heights and distance problems using tachometric principles.
11. Total Station: Introduction to total station and practicing setting up, leveling up and elimination of parallax error.
12. Determination of area perimeter using total station.
13. Determination of distance between two inaccessible point by using total station.
14. Setting out a curve

Note: Any 10 field work assignments must be completed

Web sources:

<https://sl-iitr.vlabs.ac.in/>

https://scene.iitmandi.ac.in/teaching_labs_details/survey-lab

II-I Semester

L	T	P	C
0	0	3	1.5

STRENGTH OF MATERIALS LABORATORY

Course Outcomes

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

- Conduct tensile strength tests and illustrate stress-strain diagrams for ductile metals. (Apply)
- Perform bending tests and determine load-deflection curves for steel/wood. (Analyze)
- Conduct torsion tests and calculate torsion parameters. (Apply)
- Perform hardness, impact, and shear strength tests, and compute hardness numbers, impact, and shear strengths. (Evaluate)
- Conduct tests on closely coiled and open coiled springs and compute deflections. (Apply)

List of experiments:

1. Tension test on mild steel / HYSD bars
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test
5. Hardness test
6. Compression test on Open coiled springs
7. Tension test on Closely coiled springs
8. Compression test on wood
9. Izod / Charpy Impact test on metals
10. Shear test on metals
11. Continuous beam – deflection test

Web Sources:

<https://www.vlab.co.in/ba-nptel-labs-civil-engineering>

<https://sm-nitk.vlabs.ac.in/>

II-I Semester
SOFT SKILLS

L	T	P	C
1	0	2	2

Course Objectives:

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To enhance healthy relationship and understanding within and outside an organization
- To function effectively with heterogeneous teams

Course Outcomes

- List out various elements of soft skills (L1, L2)
- Describe methods for building professional image (L1, L2)
- Apply critical thinking skills in problem solving (L3)
- Analyse the needs of an individual and team for well-being (L4)
- Assess the situation and take necessary decisions (L5)
- Create a productive workplace atmosphere using social and work-life skills ensuring personal and emotional well-being (L6)

UNIT I

Soft Skills & Communication Skills

Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills -Significance, process, types - Barriers of communication - Improving techniques.

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity.

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation.

DR23

Department of Electronics and Communication Engineering Regulations

COURSE STRUCTURE

(Applicable from the academic year 2023-24 onwards)

UNIT II

Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking - Positive thinking - Reflection

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT III

Problem Solving & Decision Making

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Team building - Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion.

UNIT IV

Emotional Intelligence & Stress Management

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates.

UNIT V

Corporate Etiquette

Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette - Corporate grooming tips -Overcoming challenges

Activities

Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study - Business Etiquette Games

NOTE:-

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.

Prescribed Books:

1. Mitra Barun K, Personality Development and Soft Skills, Oxford University Press, Pap/Cdr edition 2012
2. Dr Shikha Kapoor, Personality Development and Soft Skills: Preparing for Tomorrow, I K International Publishing House, 2018

Reference Books:

1. Sharma, Prashant, Soft Skills: Personality Development for Life Success, BPB Publications 2018.
2. Alex K, Soft Skills S.Chand & Co, 2012 (Revised edition)
3. Gajendra Singh Chauhan & Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality Published by Wiley, 2013
4. Pillai, Sabina & Fernandez Agna, Soft Skills and Employability Skills, Cambridge University Press, 2018
5. Soft Skillsfor a Big Impact (English, Paperback, Renu Shorey) Publisher: Notion Press
6. Dr. Rajiv Kumar Jain, Dr. Usha Jain, Life Skills (Paperback English) Publisher : Vayu Education of India, 2014

L	T	P	C
2	0	0	0

II – I Semester

ENVIRONMENTAL SCIENCE

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
- To save earth from the inventions by the engineers.

UNIT I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem.
- Grassland ecosystem
- Desert ecosystem.
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of :

- a. Air Pollution.
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Textbooks:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson education
3. S.Azeem Unnisa, “Environmental Studies” Academic Publishing Company

4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd.

References:

1. Deeksha Dave and E.Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M.Anji Reddy, “Text book of Environmental Sciences and Technology”, BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice Hall of India Private limited
5. G.R.Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, “Introduction to Environmental Engineering and Science, Prentice Hall of India Private limited.

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- To inculcate the basic knowledge of microeconomics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

- Define the concepts related to Managerial Economics, financial accounting and management(L2)
- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (L2)
- Apply the Concept of Production cost and revenues for effective Business decision (L3)
- Analyze how to invest their capital and maximize returns (L4)
- Evaluate the capital budgeting techniques. (L5)
- Develop the accounting statements and evaluate the financial performance of business entity (L5)

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 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. Ahuja Hl Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, NewAge International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

Online Learning Resources:

<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 – II Semester
Engineering Geology

L	T	P	C
3	0	0	3

Course Outcomes

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

Course Outcomes	
CO 1	Explain the significance of geological agents on the Earth's surface and their importance in civil engineering. (Understand)
CO 2	Identify and understand the properties of megascopic minerals and rocks. (Understand)
CO 3	Describe the concepts of groundwater and its geophysical methods and apply knowledge to identify site parameters such as contour, slope, and aspect for topography. (Understand, Apply)
CO 4	Classify earthquake-prone areas, landslides, and subsidence zones, and measure these hazards to practice hazard zonation. (Analyze)
CO 5	Investigate project sites for civil engineering projects, including site selection for mega projects like dams, reservoirs, and tunnels, using strike and dip problem-solving. (Evaluate, Analyze)

Unit 1

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 2

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, Sandstone, Limestone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

Unit 3

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 4

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 5

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.

Textbooks:

1. Engineering Geology for Civil Engineers Varghese .P.C. Delhi : pHI learning.
- 2.N. Chenna Kesavulu, Engineering Geology, Laxmi Publications, 2nd edition.

References:

- 1.Subinoy Gangopadhyay, Engineering Geology, Oxford University Press, 1st edition, 2012.
- 2.D. Venkat Reddy, Engineering Geology, Vikas Publishing, 2nd edition, 2017.

Web Sources

<https://nptel.ac.in/courses/105105106>

https://onlinecourses.nptel.ac.in/noc23_ce107/preview

Virtual Lab

<https://mg-nitk.vlabs.ac.in/>

II – II Semester
Building Materials and Concrete Technology

L	T	P	C
3	0	0	3

Course Outcomes

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

Course Outcomes	
CO 1	Know various engineering properties of building construction materials and suggest their suitability (Understand)
CO 2	Describe the basic ingredients of concrete and their role in its production and behavior in the field and Test the properties of fresh and hardened concrete. (Apply)
CO 3	Explain the basic concepts of concrete. (Understand)
CO 4	Design the concrete mix using the BIS method. (Apply)
CO 5	Evaluate the ingredients of concrete through lab test results and recognize the importance of concrete quality. (Evaluate)

Unit 1

Stones: Classification of Stones – Properties of stones in structural requirements.

Bricks: Composition of good brick earth, Various methods of manufacturing of bricks.

Tiles: Characteristics of good tile – Manufacturing methods, Types of tiles.

Wood: Structure – Properties – Seasoning of timber – Classification of various types of woods used in buildings – Defects in timber.

Paints: White washing and distemping, Constituents of paint – Types of paints – Painting of new and old wood – Varnish

Unit 2

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 – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves - Quality of mixing water.

Unit 3

Building Services: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations: Functional requirements systems of ventilations. Air-conditioning - Essentials and Types; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire Hazards – Classification of fire resistant materials and constructions

Fresh Concrete: Steps in Manufacture of Concrete–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, Shotcrete.

Unit 4

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 – Testing of Hardened Concrete, Factors affecting strength, Non-destructive testing methods
Elasticity, Creep and Shrinkage – Modulus of elasticity – Dynamic modulus of elasticity – Poisson’s ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Effects of creep – Shrinkage –types of shrinkage.

Unit 5

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

Textbooks

1. S. K. Duggal, “Building Materials”, 2nd Edition, New Age International Publishers, 2010.
2. S.C. Rangwala, “Engineering Materials”, Charotar Publications, New Delhi, 2nd Edition.
3. M. S. Shetty, Concrete Technology, S. Chand & Co., 2004.
4. M. L. Gambhir, Concrete Technology, Tata McGraw Hill Publishers, New Delhi, 5th edition, 2013.

References

1. Building Material Varghese,P.C, New Delhi P H I
2. Building Materials Duggal,S.K. Delhi New Age International
3. Concrete Technology: Theory and Practice M.S. Shetty, New Delhi S. Chand & Company Ltd.
4. Concrete Technology Santha kumar,A.R America Oxford University Press.

Web sources

<https://archive.nptel.ac.in/courses/105/106/105106206/>

<https://archive.nptel.ac.in/courses/105/102/105102088/>

<https://archive.nptel.ac.in/courses/105/102/105102012/>

<https://archive.nptel.ac.in/courses/105/104/105104030/>

**II – II Semester
Structural Analysis**

L	T	P	C
3	0	0	3

Course Outcomes

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

Course Outcomes	
CO 1	Apply energy theorems to evaluate trusses. (Apply)
CO 2	Analyze indeterminate structures using Castigliano's Second Theorem. (Analyze)
CO 3	Analyze the behavior of fixed and continuous beams. (Analyze)
CO 4	Evaluate continuous beams and portal frames using the slope-deflection method. (Evaluate)
CO 5	Evaluate continuous beams and portal frames using the moment-distribution method. (Evaluate)

Unit 1

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 pinjointed trusses.

Unit 2

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 3

Fixed and Continuous Beams: Fixed beams: Analysis, SF and BM and calculations of deflections, effect of sinking and rotation of a support. Statically indeterminate (maximum of three span using three moment theorem) beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams–

Unit IV

Slope - Deflection Method: Introduction-derivation of slope deflection equations- application to continuous beams with and without settlement of supports - Analysis of single bay and single storeyed portal frames without sway.

Unit V

Moment Distribution Method: Introduction to moment distribution method- Application to continuous beams with and without settlement of supports-Analysis of Analysis of single bay and single storeyed portal frames without sway.

Textbooks:

1. C. S. Reddy, Basic Structural Analysis, Tata McGraw Hill Publishers, 3rd edition, 2017.
2. V. N. Vazirani and M. M. Ratwani, Analysis of Structures – Vol. I & II, Khanna Publications, New Delhi

Reference Books:

1. Dr. R. Vaidyanathan and Dr. P. Perumal, Structural Analysis Vol. I and II, Laxmi Publications, 3rd edition, 2016.
2. Structural Analysis Hibbeler, R.C. New Delhi Pearson Education
3. Structural Analysis Vaidyanathan, R. bengaluru Laxmi Publications(P) Ltd

Web Sources

<https://archive.nptel.ac.in/courses/105/105/105105166/>

<https://archive.nptel.ac.in/courses/105/101/105101085/>

https://onlinecourses.nptel.ac.in/noc22_ce29/preview

**II – II Semester
Hydraulics and Hydraulic
Machinery**

L	T	P	C
3	0	0	3

Course Outcomes

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

Course Outcomes	
CO 1	Apply their knowledge of fluid mechanics in addressing problems in open channels and hydraulic machinery.
CO 2	Explain the characteristics of laminar and turbulent flows. (Understand)
CO 3	Analyze non-uniform flow problems & the hydraulic jump phenomenon in open channel flows. (Analyze)
CO 4	Evaluate the impact of jets on plates and Centrifugal pumps (Evaluate)
CO 5	Describe the principles, losses, and efficiencies of Turbines. (Understand)

Unit 1

Open Channel Flow – I: Introduction to Open channel flow-Comparison between open channel flow and pipe flow, Classification of open channel flows, Velocity distribution. Uniform flow – Characteristics of uniform flow, Chezy’s, Manning’s and Bazin formulae for uniform flow – Factors affecting Manning’s Roughness Coefficient. Most economical sections. Computation of Uniform flow, Normal depth.

Critical Flow: Specific energy – critical depth - computation of critical depth – critical, sub critical and super critical flows-Channel transitions.

Unit 2

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 3

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 4

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Velocity triangles at inlet and outlet.

Centrifugal Pumps: Pump installation details – classification – work done – Manometric head – minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel – performance of pumps – characteristic curves – NPSH – Cavitation. Reciprocating pumps – Working, discharge, slip indicator diagrams.

Unit 5

Hydraulic Turbines : Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines. Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and efficiency. Governing of turbines-surge tanks-unit and specific quantities, selection of turbines, performance characteristics-geometric similarity-cavitation.

Textbooks

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House, 22nd edition, 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. Frank M. White, Henry Xue, Fluid Mechanics, Tata McGraw Hill, 9th edition, 2022
3. S. K. Som, Gautam Biswas, S. Chakraborty, Introduction to Fluid Mechanics & Fluid Machines, 3rd edition, 2011

Web Sources

<https://archive.nptel.ac.in/courses/112/103/112103249/>

<https://nptel.ac.in/courses/105105203>

<https://www.youtube.com/watch?v=z9wsUWaN-oY>

**II – II Semester
Concrete Technology
Laboratory**

L	T	P	C
0	0	3	1.5

Course Outcomes

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

Course Outcomes	
CO 1	Explain the importance of testing cement. (Understand)
CO 2	Describe the properties of cement. (Understand)
CO 3	Evaluate different properties of aggregates. (Evaluate)
CO 4	Analyze fresh concrete properties and their relevance to hardened concrete. (Analyze)
CO 5	Evaluate hardened concrete properties. (Evaluate)

List of experiments

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.

Tests on Fine and Coarse Aggregates

Grading and fineness modulus of aggregate by sieve analysis. Specific gravity of aggregate
Water absorption and bulking of sand.

Tests on fresh Concrete

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

Tests on Hardened Concrete

Compressive strength of cement concrete
Split tensile strength of concrete.
Modulus of rupture
Modulus of Elasticity and Poisson's Ratio

Non-Destructive testing on concrete Rebound hammer and UPV techniques and not limited to the above (for demonstration)

Note: Any 10 experiments must be completed

II – II Semester
Building Planning and
Drawing

L	T	P	C
0	0	4	2

Course Outcomes

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

Course Outcomes	
CO 1	Plan various buildings according to the building by-laws. (Create)
CO 2	Analyze the relationship between the plan, elevation, and cross-section to identify the form and functions among buildings. (Analyze)
CO 3	Illustrate signs and bonds. (Apply)
CO 4	Illustrate different building units. (Apply)
CO 5	Develop the skills to draw building elements and plan buildings according to requirements. (Create)

List of experiments

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

Textbooks

1. Gurcharan Singh and Jagdish Singh, Planning, Designing and Scheduling.
2. Building planning and drawing 8th ed Kumara swamy, N, Gujarat : Charatar publication.
3. M. Chakraborti, Building Planning and Drawing.

Reference Books

1. National Building Code, 2016 (Volume I & II).
<https://www.bis.gov.in/standards/technical-department/national-building-code/>
2. M. G. Shah and C. M. Kale, Principles of Building Drawing, Trinity Publications, New Delhi.

II – II Semester

L	T	P	C
1	0	2	2

Auto CAD

Course Outcomes

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

Course Outcomes	
CO 1	The objective of this lab is to teach the student usage of Auto cad, basic drawing fundamentals in various civil engineering applications, especially in building drawing.
CO 2	The objective of this course is to teach students the basic commands and tools necessary for professional 2D drawing
CO 3	Students able to learn to sketch and take field dimensions.
CO 4	Students able to learn to take data and transform it into graphic drawings.
CO 5	Students able to learn basic engineering drawing formats

List of experiments

1. Introduction to Auto CAD
2. Different Softwares for CAD
3. Practice Exercises on Auto CAD Software
4. Drawing Plan of a building in Auto CAD
 - a) Plan of a Single Storeyed building in Auto CAD
 - b) Plan of a Multi Storeyed building in Auto CAD
5. Drawing Section and Elevation of a building in Auto CAD
 - a) Section and Elevation of a Single Storeyed building in Auto CAD
 - b) Section and Elevation of a Multi Storeyed building in Auto CAD
6. Detailing of building components like Doors, Windows, Roof Trusses
7. Exercises on development of working drawings of buildings in Auto CAD

II – II Semester

DESIGN THINKING & INNOVATION

L	T	P	C
1	0	2	2

Course Objectives:

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes:

1. Define the concepts related to design thinking. (L1, L2)
2. Explain the fundamentals of Design Thinking and innovation (L1, L2)
3. Apply the design thinking techniques for solving problems in various sectors. (L3)
4. Analyse to work in a multidisciplinary environment (L4)
5. Evaluate the value of creativity (L5)
6. Formulate specific problem statements of real time issues (L3, L6)

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, customer, 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 modelling, 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, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shrutin N Shetty, Design the Future, Norton Press
3. William Lidwell, Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough. H, The Era of Open Innovation – 2013

Online Learning 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

II Year - II Semester

L	T	P	C
0	0	3	1.5

ENGINEERING GEOLOGY LAB

LIST OF EXPERIMENTS

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

TEXT BOOKS:

1. Engineering Geology, N. Chenn Kesavulu, Laxmi Publications, 2nd Edition, 2014.
2. Engineering Geology, Subinoy Gangopadhyay, Oxford University press.

REFERENCES:

1. Engineering Geology, D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.
2. Engineering Geology, Vasudev Kanithi, University Press.
3. Engineering Geology for Civil Engineers P. C. Varghese, PHI learning pvt. Ltd.