DEPARTMENT OF CIVIL ENGINEERING

B.Tech. II Year I Semester (DR24) - Civil Engineering

S.No.	Category	Subject Code	Title	L	T	P	Credits
1	BS	BT24BS2101	Numerical Techniques and Statistical Methods	3	0	0	3
2	HSMC	BT24HS2101	Universal human values – Understanding harmony and Ethical human conduct	2	1	0	3
3	Engineering Science	BT24CE2101	Surveying	3	0	0	3
4	Professional Core	BT24CE2102	Strength of Materials	3	0	0	3
5	Professional Core	BT24CE2103	Fluid Mechanics	3	0	0	3
6	Professional Core	BT24CE2104	Surveying Field work Lab	0	0	3	1.5
7	Professional Core	BT24CE2105	Strength of Materials Lab	0	0	3	1.5
8	Skill Enhancement Course	BT24CE2106	Building Planning and Drawing	0	1	2	2
9	Audit Course	BT24BS2106	Environmental Science	2	0	0	-
Total				**14**	**2**	**8**	**20**

B.Tech. II Year II Semester (DR24) - Civil Engineering

S.No.	Category	Subject Code	Title	L	T	P	Credits
1	Management Course-I	BT24HS2201	Managerial Economics and Financial Analysis	2	0	0	2
2	Engineering Science / Basic Science	BT24CE2201	Engineering Geology	3	0	0	3
3	Professional Core	BT24CE2202	Concrete Technology	3	0	0	3
4	Professional Core	BT24CE2203	Structural Analysis	3	0	0	3
5	Professional Core	BT24CE2204	Hydraulics & Hydraulic Machinery	3	0	0	3
6	Professional Core	BT24CE2205	Concrete Technology Lab	0	0	3	1.5
7	Professional Core	BT24CE2206	Engineering Geology lab	0	0	3	1.5
8	Skill Enhancement course	BT24CE2207	Remote Sensing & Geographical Information Systems	0	1	2	2
9	Engineering Science	BT24ME2207	Design Thinking & Innovation	1	0	2	2
10	Mandatory course	BT24CE2208	Building materials and Construction	3	0	0	-
Total				**18**	**1**	**10**	**21**
Note: An 8 weeks community service project will be evaluated in III year – I semester							

DEPARTMENT OF BASIC SCIENCE AND HUMANITIES

II Year – I Semester		L	T	P	C
Course Code:	BT24BS2101	3	0	0	3
NUMERICAL TECHNIQUES AND STATISTICAL METHODS					

Course Objectives: Students will learn

1 To elucidate the different numerical methods to solve nonlinear algebraic equations
2 To disseminate the use of different numerical techniques for carrying out numerical integration.
3 To familiarize the students with the foundations of probability and statistical methods.
4 To equip the students to solve application problems in their disciplines.

Course Out Comes: At the end of the course, the student will be able to

CO1	Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals	Apply
CO2	Apply numerical integral techniques to different Engineering problems. Apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations	Apply
CO3	Apply discrete and continuous probability distributions	Apply
CO4	Compute the mathematical expectation (mean) and variance of random variables	Evaluate
CO5	Design the components of a classical hypo thesis	Create
CO6	Infer the statistical inferential methods based on small and large sampling tests	Analyze

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-
CO6	3	3	-	-	-	-	-	-	-	-	-	-
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

Detailed Syllabus:

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 1/3rd and 3/8th 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, z2 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, z2-test.

TextBooks:

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.

References:

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, Keying Ye, Ronald E Walpole, Probability and Statistics Engineers and the Scientists,8th Edition, Pearson 2007.
6 Jay l. Devore, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.

DEPARTMENT OF BASIC SCIENCE AND HUMANITIES

II Year I Semester		L	T	P	C
Course Code:	BT24HS2101	2	1	0	3
UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT					

Course Objectives: Students will learn

1. 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.
2. 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.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Course Outcomes:

CO1	Define the terms like Natural Acceptance, Happiness and Prosperity	Remember
CO2	Identify one's self, and one's surroundings (family, society nature)	Understand
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life	Apply
CO4	Relate human values with human relationship and human society.	Analyze
CO5	Justify the need for universal human values and harmonious existence	Evaluate
CO6	Develop as socially and ecologically responsible engineers	Apply

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	3	3	-	2	-	3
CO2	-	-	-	-	-	-	-	3	2	2	-	3
CO3	-	-	-	-	-	-	-	3	2	-	-	2
CO4	-	-	-	-	-	-	3	3	2	2	-	3
CO5	-	-	-	-	-	-	3	3	-	-	-	3
CO6	-	-	-	-	-	-	3	2	-	-	-	-
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

Detailed Syllabus:

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 theRole 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 (4Lectures and 2Tutorials for P ractice 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:

Unit I	Introduction to Value Education PS1 Sharing about Oneself PS2 Exploring Human Consciousness PS3 Exploring Natural Acceptance
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
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
Unit IV	Harmony in the Nature (Existence) 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 PS12 Exploring Ethical Human Conduct PS13 Exploring Humanistic Models in Education PS14 Exploring Steps of Transition towards Universal Human Order

TextBooks:

1 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
2 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

References:

1 JeevanVidya: EkParichaya, A Nagaraj, Jeevan VidyaPrakashan, 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
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/UHVII%20Class%20Notes%20&%20Handouts/UHV%20Handout%201- Introduction%20to%20Value%20Education.pdf
2.https://fdp-si.aicte-india.org/UHVII%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%20 Family.pdf
4.https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.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.aicteindia.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

DEPARTMENT OF CIVIL ENGINEERING

II	Year	I	Semester	L	T	P	C
Course Code:		**BT24CE2101**		**3**	**0**	**0**	**3**
SURVEYING							

Course Objectives: Students will learn

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

Course OutComes: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Apply the principle and methods of surveying and measuring of horizontal and vertical- distances and angles	**L2**
CO2	Identify the source of errors and rectification methods	**L3**
CO3	Apply surveying principles to determine areas and volumes	**L2**
CO4	Setting out curves and using modern surveying equipment	**L3**
CO5	Apply the basics of Photogrammetry Surveying in field	**L4**

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	2	1	3	-	3	3	3	-	1
CO2	3	2	-	2	2	2	-	2	2	2	-	2
CO3	3	1	-	1	1	1	-	1	2	2	-	2
CO4	3	3	-	3	3	1	-	1	1	1	-	2
CO5	3	1	-	3	3	1	-	1	1	1	-	2
Mapping-	**3: High;**			**2: Moderate;**			**1-Low**					

CO/ PSO	PSO1	PSO2
CO1	1	1
CO2	2	-
CO3	3	1
CO4	1	3
CO5	3	2

Detailed Syllabus:

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 Tachometric 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.

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.

References:

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 - LaxmiPublications (P) ltd., New Delhi 16th 2023
4 Plane Surveying and Higher Surveying‖ by Chandra A M, New age Internation1al 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.

DEPARTMENT OF CIVIL ENGINEERING

II	Year	I	Semester	L	T	P	C
Course Code:		BT24CE2102		3	0	0	3
STRENGTH OF MATERIALS							

Course Objectives: Students will learn

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: At the end of the course, the student will be able to

CO	Statement	BL
CO1	To understand the basic materials behavior under the influence of different External loading conditions and the support conditions.	L2
CO2	To draw the diagrams indicating the variation of the key performance features like axial forces, bending moment and shear forces in structural members.	L3
CO3	To acquire knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams	L2
CO4	To analyze the deflections due to various loading conditions.	L3
CO5	To assess stresses across section of the thin, thick cylinders and columns to arrive at optimum sections to withstand the internal pressure using Lame's equation	L4

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	-	2	-	-	-	-	-	2	1	3
CO2	2	1	-	1	-	-	-	-	-	1	1	2
CO3	2	2	-	1	-	-	-	-	-	2	1	2
CO4	1	2	-	1	-	-	-	-	-	2	1	1
CO5	2	1	-	2	-	-	-	-	-	1	1	2
Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	3	3
CO2	3	3
CO3	3	2
CO4	3	3
CO5	3	2
CO6	3	3

Detailed Syllabus:

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 Columns, Thin & Thick Cylinders

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

Text Books:

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 McGill Publications 3rd Edition, 2016.

Online learning resources :

1. https://blog.tatanexarc.com/da/steel-bar-test/
2. https://cs-iitd.vlabs.ac.in/exp/bend-rebend/theory.html

DEPARTMENT OF CIVIL ENGINEERING

II	Year	I	Semester	L	T	P	C
Course Code:		BT24CE2103		3	0	0	3
FLUID MECHANICS							

Course Objectives: Students will learn

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: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Understand the principles of fluid statics, kinematics and dynamics	L2
CO2	Apply the laws of fluid statics and concepts of buoyancy	L3
CO3	Understand the fundamentals of fluid kinematics and differentiate types of fluid flows	L2
CO4	Apply the Principle of conservation of energy for flow measurement.	L3
CO5	Analyze the losses in pipes and discharge through pipe network.	L4

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	-	-	-	-	-	2	1	3
CO2	2	1	-	1	-	-	-	-	-	1	1	2
CO3	2	2	-	1	-	-	-	-	-	2	1	2
CO4	1	2	-	1	-	-	-	-	-	2	1	1
CO5	2	1	-	2	-	-	-	-	-	1	1	2
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	3	3
CO2	3	3
CO3	3	2
CO4	3	3
CO5	3	2

Detailed Syllabus:

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.

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

References:

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

DEPARTMENT OF CIVIL ENGINEERING

II	Year	I	Semester	L	T	P	C
Course Code:		**BT24CE2104**		**0**	**0**	**3**	**1.5**
SURVEYING FIELD WORK							

Course Objectives: Students will learn

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: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Handle various linear and angular measuring instruments	L2
CO2	Measure the linear and angular measurements	L3
CO3	Calculate the area and volume by interpreting the data obtained from surveying activities	L2
CO4	Handle modern equipment such as total station	L3
CO5	Prepare field notes from survey data	L4

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	2	1	-	-	-	3	2	2	2
CO2	2	2	-	2	1	-	-	-	3	3	3	2
CO3	2	2	-	2	1	-	-	-	3	2	2	2
CO4	1	2	-	-	3	-	-	-	3	2	2	1
CO5	2	1	-	-	-	-	-	-	3	2	2	1
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	2	-
CO2	2	-
CO3	2	-
CO4	1	-
CO5	1	-
CO6	2	-

List of Field Works:

S.No	Experiments
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 points by using total station.
11	Setting out a curve
12	Determining the levels of contours

References:

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 - LaxmiPublications (P) ltd., New Delhi 16th 2023
4. Plane Surveying and Higher Surveying‖ by Chandra A M, New age Internation1al Pvt. Ltd. Publishers, New Delhi, 3rd Edition, 2015.

Online learning resources

1. https://surajjj2445.wordpress.com/wp-content/uploads/2014/09/surveying-lab-i-manual.pdf
2. https://arunprasadvarathan.blogspot.com/2014/10/survey-practical-1.html

DEPARTMENT OF CIVIL ENGINEERING

II	Year	I	Semester	L	T	P	C
Course Code:		BT24CE2105		0	0	3	1.5
STRENGTH OF MATERIALS LABORATORY							

Course Objectives: Students will learn

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: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Evaluate the values of Tensile and compressive stresses of the given specimen.	L2
CO2	Analyze stress of various beams subjected to bending loads.	L3
CO3	Examine the stiffness of the open coil and closed coil spring.	L2
CO4	Evaluate the capacity of a material to withstand torsional and shearing stresses.	L3
CO5	Determine the hardness, impact strength to analyze the application of a specific material.	L4
CO6	Determine the of stress, strain, deformation of material under different types of loading.	L3

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	-	-	-	2	2	-	1
CO2	3	2	1	2	1	-	-	-	2	2	-	1
CO3	3	2	1	2	1	-	-	-	2	2	-	1
CO4	3	2	1	2	1	-	-	-	2	2	-	1
CO5	3	2	1	2	1	-	-	-	2	2	-	1
CO6	3	2	1	2	1	-	-	-	2	2	-	1
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	3	-
CO2	3	-
CO3	3	-
CO4	3	-
CO5	3	-
CO6	3	-

List of Experiments:

S.No	Experiments
1	Tension test on rebar
2	Bending test on (Steel/Wood) Cantilever beam.
3	Bending test on simply supported beam.
4	Torsion test on steel bars
5	Hardness test on steel bars
6	Compression test on Open coiled springs
7	Tension test on Closely coiled springs
8	Compression test on wood /concrete/bricks
9	Izod / Charpy Impact test on metals
10	Shear test on metals
11	Use of electrical resistance strain gauges.
12	Continuous beam – deflection test.

Reference Books:

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).

Online learning resources :

1. https://blog.tatanexarc.com/da/steel-bar-test/
2. https://cs-iitd.vlabs.ac.in/exp/bend-rebend/theory.html

DEPARTMENT OF CIVIL ENGINEERING

II	Year	I	Semester	L	T	P	C
Course Code:		BT24CE2106		0	1	2	2
BUILDING PLANNING AND DRAWING							

Course Objectives: Students will learn

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: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Plan various buildings as per the building by-laws.	L2
CO2	Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.	L3
CO3	Draw signs and bonds	L2
CO4	Draw different building units	L3
CO5	Learn the skills of drawing building elements and plan the buildings as per requirements.	L4

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2	-	-	3	3	2	-	2	2	2
CO2	1	1	2	-	-	3	2	-	-	2	1	1
CO3	1	1	2	-	-	3	3	2	-	2	2	2
CO4	1	1	2	-	-	3	3	2	-	2	2	2
CO5	1	1	2	-	-	3	3	2	-	2	2	2
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	3	3
CO2	-	2
CO3	3	3
CO4	3	3
CO5	3	3
CO6	3	3

List of Experiments:

S.No	Experiments
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. Chakraborty.
3 Building drawing, M G Shah, C M Kale and S Y Patki,Tata McGraw Hill, New Delhi.

References:

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.

DEPARTMENT OF BASIC SCIENCE & HUMANITIES

II	Year	I	Semester	L	T	P	C
Course Code:		BT24BS2106		2	0	0	-
ENVIRONMENTAL SCIENCE							

Course Objectives: Students will learn

1. To make the students to get awareness on environment
2. 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
3. To save earth from the inventions by the engineers

Course OutComes: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Grasp multi-disciplinary nature of environmental studies and various renewable and non-renewable resources.	L2
CO2	Understand flow and bio-geo- chemical cycles and ecological pyramids.	L2
CO3	Understand various causes of pollution and solid waste management and related preventive measures.	L2
CO4	Understand the rainwater harvesting, watershed management, and ozone layer depletion and waste land reclamation.	L2
CO5	Illustrate the causes of population explosion, value education and welfare programs.	L3
CO6	Explain the importance of environment and human health.	

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	3	-	-	-	-	1
CO2	2	3	2	-	-	-	2	-	-	-	-	1
CO3	2	2	1	-	-	-	1	-	-	-	-	1
CO4	2	1	2	-	-	-	1	-	-	-	-	1
CO5	3	2	2	-	-	-	1	-	-	-	-	1
CO6	2	2	2	-	-	-	1	-	-	-	-	1
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

Detailed Syllabus:

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 and 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-sports 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: Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, 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, and 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, and 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.

Fieldwork: 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 Erach Bharucha, Text book of Environmental Studies for Undergraduate Courses, University Press (India) Private Limited, 2019.
2 Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.
3 S.Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.
4 K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

Reference Books:

1 Deeksha Dave and E.SaiBaba Reddy,Textbook of Environmental Science, 2/e,Cengage Publications, 2012.
2 M.Anji Reddy, Textbook of Environmental Sciences and Technology, BS Publication, 2014.
3 J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.
4 J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.
5 G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.
6 Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science, 1/e, Prentice Hall of India Private limited, 1991.

Online Learning Resources:

1 https://onlinecourses.nptel.ac.in/noc23_hs155/preview
2 https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmental-science-part-3- pollution-and-resources?index=product&objectID=course-3a6da9f2-d84c-4773-83881b2f8f6a75f2&
3 http://ecoursesonline.iasri.res.in/Courses/Environmental%20Science-I/Data%20Files/pdf/lec07.pdf https://www.youtube.com/watch?v=5QxxaVfgQ3k

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DR24

ENGINEERING CURRICULUM

W.e.f. 2024-25

II YEAR – II SEMESTER

B.Tech. (Regular-Full time)

(Effective for the students admitted into I year from
The Academic Year **2024-25** onwards)

DEPARTMENT OF BASIC SCIENCE & HUMANITIES

II	Year	II	Semester	L	T	P	C
Course Code:		BT24HS2201		2	0	0	2
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS							

Course Objectives: Students will learn

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

Course Outcomes: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Define the concepts related to Managerial Economics, financial accounting and management	L2
CO2	Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets	L2
CO3	Apply the Concept of Production cost and revenues for effective Business decision	L3
CO4	Analyze how to invest their capital and maximize returns	L4
CO5	Evaluate the capital budgeting techniques.	L5
CO6	Develop the accounting statements and evaluate the financial performance of business entity	L5

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	2	-	-	-	2	3
CO2	-	-	-	-	-	-	2	-	-	-	2	3
CO3	-	-	-	-	-	-	3	-	-	-	2	2
CO4	-	-	-	-	-	-	2	-	-	-	2	3
CO5	-	-	-	3	3	-	2	2	-	-	3	3
CO6	-	-	-	3	3	-	2	2	-	-	3	2
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

Detailed Syllabus:

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 behavior- 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.

Text Books:

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

Reference Books:

1 Ahuja Hl Managerial economics S chand.
2 S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age 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:

1 https://www.slideshare.net/123ps/managerial-economics-ppt
2 https://www.slideshare.net/rossanz/production-and-cost-45827016
3 https://www.slideshare.net/darkyla/business-organizations-19917607

DEPARTMENT OF CIVIL ENGINEERING

II	Year	II	Semester	L	T	P	C
Course Code:		**BT24CE2201**		**3**	**0**	**0**	**3**
ENGINEERING GEOLOGY							

Course Objectives: Students will learn

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: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Understand the significance of geological agents on Earth surface and its significance in Civil Engineering.	L2
CO2	Identify and understand the properties of Minerals and Rocks.	L2
CO3	Understand the concepts of Groundwater and its geophysical methods.	L3
CO4	Classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard zonation.	L4
CO5	Investigate the project site for mega/mini civil engineering projects and site selection for mega engineering projects like Dams, Reservoirs and Tunnels.	L5

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	1
CO2	2	1	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	2	3	-	2	-	-	-	2	2
CO5	3	3	2	2	3	-	2	-	-	-	2	2
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	2	-
CO2	1	-
CO3	1	-
CO4	2	-
CO5	2	-
CO6	2	-

Detailed Syllabus:

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 bells, 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 Tunneling, effects, Lining of Tunnels. Influence of Geology for successful Tunneling.

Text Books:

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

Reference Books:

1 Engineering Geology by Subinoy Gangopadhay Oxford University press 1st edition, 2012.
2 Engineering Geology by D. Venkat Reddy, Vikas Publishing, 2nd Edn, 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.

Online Learning Resources:

1 http://nptel.iitm.ac.in/video.php?subjectId=105105106
2 http://nptel.iitm.ac.in/video.php?courseId=1055&p=1
3 http://nptel.iitm.ac.in/video.php?courseId=1055&p=3
4 http://nptel.iitm.ac.in/video.php?courseId=1055&p=4

DEPARTMENT OF CIVIL ENGINEERING

II	Year	II	Semester	L	T	P	C
Course Code:		BT24CE2202		3	0	0	3
CONCRETE TECHNOLOGY							

Course Objectives: Students will learn

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: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field	L2
CO2	Test the fresh concrete properties and the hardened concrete properties. Understand the basic concepts of concrete. Design the concrete mix by BIS method.	L2
CO3	Evaluate the ingredients of concrete through lab test results, realize the importance of quality of concrete	L3
CO4	Understand the behaviour of concrete in various environments.	L4
CO5	Familiarize the basic concepts of special concrete and their production and applications.	L5

CO-PO Mapping:

CO/ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	-	-	-	2	2	-	-	-	-	-
CO2	3	3	2	-	2	-	2	-	-	-	2	-
CO3	3	2	3	-	2	-	2	-	-	-	-	-
CO4	3	2	-		3	2	-	-	-	2	3	-
CO5	3	3	2	-	2	2	-	2	-	-	2	-
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	3	-
CO2	3	-
CO3	3	-
CO4	-	-
CO5	-	-
CO6	3	-

Detailed Syllabus:

UNIT I CEMENTS & AGGREGATES

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

Fibre reinforced concrete – Different types of fibers – 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, Cengagae Publications, 1st edition, 2015

Reference Books:

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

Online learning resources :

1.https://www.youtube.com/watch?v=cx5gPKp9QEc&list=PLbMVogVj5nJQU7M0LdA77p_XaaWBJniNc
2.https://www.youtube.com/watch?v=6ju8mig4VoU&list=PLbMVogVj5nJT6RXK4VKPGOfWHp2ZH8xin
3. https://www.youtube.com/watch?v=227GcdVxWVQ

DEPARTMENT OF CIVIL ENGINEERING

II	Year	II	Semester	L	T	P	C
Course Code:		BT24CE2203		3	0	0	3
STRUCTURAL ANLAYSIS							

Course Objectives: Students will learn

1. Learn energy theorems
2. Learn the analysis of indeterminate structures
3. Analysis of fixed and continuous beams
4. Learn about slope-deflection method
5. Learn about Moment – distribution method

Course Outcomes: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Apply energy theorems to analyze trusses	L2
CO2	Analyze indeterminate structures by using Castigliano's–II theorem	L2
CO3	Analysis of fixed and continuous beams	L3
CO4	Analyze continuous beams and portal frames by using slope-deflection method	L4
CO5	Analyze continuous beams and portal frames by using Moment – distribution method	L5

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	3	-	-	-	-	-	-	-
CO3	3	3	2	-	3	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	2	-
CO2	-	-
CO3	3	3
CO4	3	3
CO5	3	3
CO6	2	-

Detailed Syllabus:

UNIT I 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.

UNIT II ANALYSIS OF INDETERMINATE STRUCTURES:

Indeterminate Structural Analysis – Determination of static and kinematic indeterminacy – Solution of trusses with up-to two degrees of internal and external indeterminacy – Castigliano's‘s–II theorem.

UNIT III FIXED BEAMS & CONTINUOUS BEAMS

Introduction to statically indeterminate 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 – Deflection of fixed beams effect of sinking of support, effect of rotation of a support-Calpeyron's Theorem of Three Moments for the analysis of continuous beams.

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 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 single bay storey portal frames without sway.

Text Books:

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

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

Online learning resources :

1. https://archive.nptel.ac.in/courses/105/105/105105166/
2. https://drive.google.com/file/d/1sd563RgHeTiwKp0CYaHC5FV43M3RANPS/view

DEPARTMENT OF CIVIL ENGINEERING

II	Year	II	Semester	L	T	P	C
Course Code:		BT24CE2204		3	0	0	3
HYDRAULICS AND HYRAULIC MACHINERY							

Pre-requisite: Fluid Mechanics

Course Objectives: Students will learn

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: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Understand the characteristics of laminar and turbulent flows.	L2
CO2	Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels.	L3
CO3	Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows.	L3
CO4	Evaluate the performance of impact of jets on plates and design Pelton wheel, Francis and Kaplan turbine	L5
CO5	Understand the principles, losses and its efficiencies of centrifugal pumps	L2

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	2	-	-	-	-	2	-
CO2	3	3	-	-	-	3	-	-	-	-	3	-
CO3	3	3	-	-	-	3	-	-	-	-	3	-
CO4	3	3	-	-	-	3	-	-	-	-	3	-
CO5	3	2	-	-	-	2	-	-	-	-	2	-
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	3	1
CO2	3	2
CO3	3	2
CO4	3	3
CO5	3	2
CO6	3	1

Detailed Syllabus:

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/

DEPARTMENT OF CIVIL ENGINEERING

II	Year	II	Semester	L	T	P	C
Course Code:		BT24CE2205		0	0	3	1.5
CONCRETE TECHNOLOGY LABORATORY							

Course Objectives: Students will learn

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

Course OutComes: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Outline importance of testing cement and its properties	L2
CO2	Assess different properties of Aggregates	L2
CO3	Assess fresh concrete properties and their relevance to hardened concrete	L3
CO4	Assess hardened concrete properties	L4
CO5	Describe the preparation of green concrete	L5
CO6	Outline the importance of testing of cement and its properties	L3

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	2	2	1	-	-	-	-	-
CO2	3	2	1	2	2	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	2	-	-	-	2	-	-
CO5	2	2	2	-	1	-	-	-	-	2	-	-
CO6	3	2	1	-	1	-	-	-	-	1	-	-
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	2	-
CO2	2	-
CO3	3	-
CO4	2	-
CO5	3	-
CO6	3	-

List of Experiments:

S.No	Experiment
Tests on Cement	
1	Normal Consistency and Fineness of cement.
2	Initial setting time and Final setting time of cement.
3	Specific gravity and soundness of cement.
4	Compressive strength of cement.
Tests on Fine Aggregates	
5	Grading and Fineness modulus of Fine aggregate by sieve analysis.
6	Specific gravity of fine aggregate
7	Water Absorption and Bulking of sand.
Tests on Coarse Aggregates	
8	Grading of Coarse aggregate by sieve analysis.
9	Specific gravity of coarse aggregate
10	Water Absorption of Coarse aggregates
Tests on Fresh Concrete	
11	Workability of concrete by Compaction Factor method
12	Workability of concrete by Slump test
13	Workability of concrete by Vee-bee test
Tests on Hardened Concrete	
14	Determine Compressive strength, Modulus of Rupture, Young's Modulus and Poisson's Ratio of Concrete
15	Split tensile strength of concrete.
16	Non-Destructive testing on concrete (for demonstration)

Reference books:

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.

Online learning resources :

1.https://www.youtube.com/watch?v=cx5gPKp9QEc&list=PLbMVogVj5nJQU7M0LdA77p_XaaWBJniNc
2.https://www.youtube.com/watch?v=6ju8mig4VoU&list=PLbMVogVj5nJT6RXK4VKPGOfWHp2ZH8xin
3. https://www.youtube.com/watch?v=227GcdVxWVQ

DEPARTMENT OF CIVIL ENGINEERING

II	Year	II	Semester	L	T	P	C
Course Code:		BT24CE2206		0	0	3	1.5
ENGINEERING GEOLOGY LABORATORY							

Course Objectives: Students will learn

1 To identify the Megascopic types of Ore minerals & Rock forming minerals.
2 To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks.
3 To identify the topography of the site & material selection

Course OutComes: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Identify Megascopic minerals & their properties.	L2
CO2	Identify Megascopic rocks & their properties.	L2
CO3	Identify the site parameters such as contour, slope & aspect for topography.	L3
CO4	Know the occurrence of materials using the strike & dip problems.	L4
CO5	Understand the properties of rocks which influences the quality of structure	L2

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-
CO3	1	3	3	-	-	-	-	-	-	2	3	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	2	-	-	-	-	3	-
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	2	-
CO2	1	-
CO3	1	-
CO4	2	-
CO5	2	-

List of Experiments:

S.No	Experiment
1	**a) Physical properties of minerals: Mega-scopic identification of**
	b) Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc.
	c) Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc.
2	**Mega-scopic 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 & Biotite schist, 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.

Online learning resources :

1. https://www.youtube.com/watch?v=ExFXga81iWQ
2. https://www.youtube.com/watch?v=A11b6tORIcM
3. https://www.geos.iitb.ac.in/index.php/gp-519-engineering-and-groundwater-geology-lab/

DEPARTMENT OF CIVIL ENGINEERING

II	Year	II	Semester	L	T	P	C
Course Code:		BT24CE2207		0	1	2	2
REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEMS							

Course Objectives: Students will learn

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 toposheets and maps.

Course OutComes: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Acquire knowledgeabout concepts of remote sensing, sensors and . their characteristics.	L2
CO2	Familiarize with data models and data structures to introduce various Raster and Vector Analysis capabilities in GIS.	L3
CO3	Digitize and create thematic map and extract important features to calculate geometry.	L3
CO4	Perform surface analysis over Contour to develop digital elevation model.	L5
CO5	Use GIS software to perform simple analysis in water resources and transportation engineering.	L2

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	1	1	-	-	2	-	-	-	-	2
CO2	2	-	1	1	-	-	2	-	-	-	-	2
CO3	1	2	2	1	2	2	3	-	2	2	1	3
CO4	1	2	2	1	2	2	3	-	2	2	1	3
CO5	1	2	2	1	2	2	3	-	2	2	1	3
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	-	1
CO2	1	3
CO3	3	3
CO4	3	3
CO5	3	3

Detailed Syllabus:

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 path analysis.

Text Books:

1 Basudeb Bhatta (2021). 'Remote sensing and GIS', 3rd edn., 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', 7th edn., Wiley India Pvt. Ltd.
4 Demers, M.N, (2013) 'Fundamentals of Geographic Information Systems', 4th edn., Wiley India Pvt. Ltd.

List of Experiments:

S.No	Experiments
1	Georeferencing a Topo sheet or Map
2	Digitization and Attribute table creation
3	Creation of Thematic Map
4	Calculation of Feature geometry – Length, Area & Perimeter.
5	Contour map – developing TIN & DEM from Contour.
6	Stream network – Stream ordering map.
7	Watershed - calculate Hydro-geomorphological parameters.
8	Transportation Network Map – Route analysis.

GIS Software: QGIS / Arc GIS

Textbook for practical

1 QGIS User Guide
2 Arc GIS 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

DEPARTMENT OF MECAHNICAL ENGINEERING

II	Year	II	Semester	L	T	P	C
Course Code:		BT24ME2207		1	0	2	2
DESIGN THINKING & INNOVATION							

Course Objectives: Students will learn

1. Bring awareness on innovative design and new product development.
2. Explain the basics of design thinking.
3. Familiarize the role of reverse engineering in product development.
4. Train how to identify the needs of society and convert into demand.
5. Introduce product planning and product development process.

Course OutComes: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Define the concepts related to design thinking.	L1
CO2	Explain the fundamentals of Design Thinking and innovation.	L2
CO3	Apply the design thinking techniques for solving problems in various sectors.	L3
CO4	Analyze to work in a multidisciplinary environment.	L4
CO5	Evaluate the value of creativity.	L5

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	2	3	-	-	-	-	-	-
CO2	3	3	1	-	2	2	-	-	-	-	-	3
CO3	3	3	2	3	-	3	2	3	3	-	-	2
CO4	3	3	3	2	3	2	3	-	-	-	-	3
CO5	3	3	2	-	3	2	-	-	-	3	-	-
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	3	-
CO2	3	-
CO3	3	-
CO4	3	-
CO5	3	-

Detailed Syllabus:

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.

TEXTBOOK:

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.

Online Learning Resources:

1 https://nptel.ac.in/courses/110/106/110106124/
2 https://nptel.ac.in/courses/109/104/109104109/
3 https://swayam.gov.in/nd1_noc19_mg60/preview
4 https://onlinecourses.nptel.ac.in/noc22_de16/preview

Website: www.jntuk.edu.in
E-mail: registrar@jntuk.edu.in

Phone: Off: 0884-2300900
Fax: 0884-2300901

28 JAN 2025 JNTUK OFFICE KAKINADA-533003, A.P.

PROCEEDINGS OF THE
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
Kakinada-533003, Andhra Pradesh (India)

Proc. No. JNTUK/DAP/Evaluation Procedure for DT&I/Approval/2025 Date: 27.01.2025

Sub: DAP – Academic Planning – Evaluation Procedure for Design Thinking and Innovation (L-T-P-C) (1-0-2-2) - Orders - Issued.

Read: e-Office No. 2690537 approved by Honourable Vice Chancellor dated 27.01.2025

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ORDER:

With reference cited above, the Honorable Vice Chancellor, JNTUK is pleased to approve the recommendations for Evaluation Procedure for Design Thinking and Innovation (L-T-P-C) (1-0-2-2) as follows:

Evaluation Procedure for Design Thinking and Innovation (L-T-P-C) (1-0-2-2):

The performance of a student **for Design Thinking and Innovation** shall be evaluated with a maximum of 100 marks.
A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination marks taken together.

Assessment Method	Marks
Internal Assessment	30
Semester End Examination	70
Total	**100**

The distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

a) **Internal Evaluation Procedure**

i) **Of the internal marks of 30, Day to Day Evaluation in the lab will be given a maximum of 7.5 Marks (25%) and Mid Exam(theory), a maximum of 22.5 Marks (75%).**

ii) During the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks of which 10 marks for objective paper (20 minutes duration), 15 marks for subjective paper (90 minutes duration) and 5 marks for assignment. **30 Marks will be scaled down to 22.5 Marks.**

a. Objective paper shall contain for 05 short answer questions with 2 marks each OR maximum of 20 bits for 10 marks.
b. Subjective paper shall contain 3 questions of internal choice (i.e., either-or type questions of which student has to answer one from each either-or type of questions, each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.
c. 5 marks for assignment
d. Mid examinations of Design thinking and Innovation to be conducted by the corresponding college.

Note:

- The subjective paper shall contain 3 either-or type questions of equal weightage of 10 marks. Any fraction shall be rounded off to the next higher mark.
- Assignments shall be in the form of problems, mini projects, design problems, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and the average marks shall be considered.

iii) If the student is absent for the mid semester examination, no re-exam shall be conducted and mid semester marks for that examination shall be considered as zero.

iv) First midterm examination shall be conducted for I, II units of syllabus with one either or type question from each unit and third either or type question from both the units. The second midterm examination shall be conducted for III, IV and V units with one either or type question from each unit.

v) Final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage given to the better mid exam and 20% to the other.

vi) If the student is absent for any one midterm examination, the final mid semester marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other.

b) **End Examination (Only Practical's) Evaluation:**
The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and a senior expert in the subject from the same department.

- Procedure: 20 marks
- Experimental work & Results: 30 marks
- Viva voce: 20 marks.

REGISTRAR
REGISTRAR
J.N.T. University Kakinada
Kakinada-533003

To
The Director of Evaluation, JNTUK Kakinada.
Copy to the Director, Academic Planning, JNTUK Kakinada.
Copy to the Secretary to Hon'ble Vice-Chancellor, JNTUK Kakinada.
Copy to the PA to the Registrar, JNTUK Kakinada.

DEPARTMENT OF CIVIL ENGINEERING

II	Year	II	Semester	L	T	P	C
Course Code:		BT24CE2208		3	0	0	0
BUILDING MATERIALS AND CONSTRUCTION (Mandatory Course)							

Course Objectives: Students will learn

1. Initiating the student with the knowledge of basic building materials and their different properties.
2. Imparting the knowledge of course pattern in masonry construction and flat roofs and techniques of forming foundation, columns, beams, walls, sloped roofs and flat roofs.
3. The student is to be exposed to the various patterns of floors, walls, different types of paints and varnishes.
4. Imparting the students with the techniques of form work and scaffolding.
5. The students should be exposed to classification of aggregates, moisture content of the aggregate.

Course Outcomes: At the end of the course, the student will be able to

CO	Statement	BL
CO1	Identify and describe various building materials and explain their functional significance in building construction.	L1
CO2	Explain the construction patterns and techniques used in masonry work.	L2
CO3	Recognize and differentiate between types of floors, walls, paints, and varnishes used in building construction..	L3
CO4	Demonstrate the techniques involved in formwork and scaffolding used for different structural elements..	L4
CO5	Classify construction aggregates and assess their properties including moisture content, grading, and suitability for various construction purposes.	L5

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	-	2	3	-	-	-	-	3
CO2	3	3	2	-	-	-		-	-	-	-	2
CO3	2	3	3	2	2	3	3	-	-	-	2	-
CO4	3	2	3	-	-	-	-	-	-	-	3	3
CO5	3	2	2	-	-	-	-	-	-	-	-	3
Level of Mapping- 3: High; 2: Moderate; 1-Low												

CO/ PSO	PSO1	PSO2
CO1	2	-
CO2	3	-
CO3	2	-
CO4	3	-
CO5	3	-

Detailed Syllabus:

UNIT I Stones, Bricks and Tiles

Properties of building stones–relation to their structural requirements, classification of stones–stone quarrying–precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile- manufacturing methods, types of tiles. Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials

UNIT II 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, Aluminum.

UNIT III 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.Variousing redients of cement concrete and their importance–various tests for concrete.

UNIT IV Building Components

Lintels, arches, vaults, staircases–types. Different types of floors–Concrete, Mosaic, Terrazz 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 V Finishings & Aggregates

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.

Aggregates: Classification of aggregates–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 sands–Sieve analysis.

Textbooks:

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

Reference Books:

1 Building Materials, S.K. Duggal, New Age International Publications.
2 Building Materials, P.C.Verghese, PHI learning (P) ltd.
3 Building Materials, M.L.Gambhir, Tata McGraw Hill Publishing Co.Ltd. New Delhi.
4 Building construction, P.C.Verghese, PHI Learning (P)Ltd.
5 Building Materials, Construction and Planning, S.Mahaboob Basha, Anuradha Publications, Chennai

Online learning resources :

1. https://www.ultratechcement.com/for-homebuilders/home-building-explained-single/descriptive-articles/raw-material-for-cement-production
2. https://onlinecourses.nptel.ac.in/noc23_ce50/preview
3. https://www.digimat.in/nptel/courses/video/105107219/L13.html