ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Rajampet, Annamayya District, A.P – 516126, INDIA

Course Structure for R24 Regulations
Department of Civil Engineering

Semester III (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
Theory Courses							
1	HSMC	24AMBA31T	Managerial Economics and Financial Analysis	3	0	0	3
2	HSMC	24AUHV31T	Universal Human Values-II	3	0	0	3
3	PCC	24ACIV31T	Strength of Materials	3	0	0	3
4	PCC	24ACIV32T	Surveying and Geomatics	3	0	0.	3
5	PCC	24ACIV33T	Fluid Mechanics, Hydraulics and Hydraulic Machinery	3	0	0	3
Laboratory Courses							
6	PCC	24ACIV31L	Strength of Materials Laboratory	0	0	3	1.5
7	PCC	24ACIV32L	Surveying and Geomatics Laboratory	0	0	3	1.5
8	PCC	24ACIV33L	Fluid Mechanics Laboratory	0	0	3	1.5
9	SC	24ACIV34L	Building Planning and Drawing	1	0	2	2
Total credits							**21.5**

Category	Credits
Basic Science course	-
Professional core Courses	13.5
Humanities Sciences	6
Skill oriented Course	2
Mandatory Course	--
Total Credits	**21.5**

Semester IV (Second year)

Sl.No	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
Theory Courses							
1	BSC	24AMAT41T	Probability and Statistics	3	1	0	3
2	ESC	24ACIV41T	Building Materials and Construction	3	0	0	3
3	PCC	24ACIV42T	Concrete Technology	3	0	0	3
4	PCC	24ACIV43T	Engineering Geology	3	0	0	3
5	PCC	24ACIV44T	Structural Analysis	3	0	0	3
Laboratory Courses							
6	PCC	24ACIV42L	Concrete Technology Laboratory	0	0	3	1.5
7	PCC	24ACIV43L	Engineering Geology Laboratory	0	0	3	1.5
8	PCC	24ACIV45L	Hydraulics and Hydraulic Machinery Laboratory	0	0	3	1.5
9	SC	24ACSE45L	Java Programming	1	0	2	2
10	MC	24AENS41T	Environmental Science	3	0	0	0
Total credits							**21.5**
Internship 2 Months (Mandatory) during summer vacation							

Category	Credits
Basic Science Courses	3
Professional core Courses	13.5
Engineering Science Courses	3
Humanities Sciences	-
Skill oriented course	2
Mandatory Course	--
Total Credits	**21.5**

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EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

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Rajampet, Annamayya District, A.P – 516126, INDIA

Title of the Course: Managerial Economics and Financial Analysis
Category: HSMC
Semester: III Semester
Couse Code: 24AMBA31T
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

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

1. Define the concepts related to Managerial Economics, financial accounting and management.
2. Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets.
3. Apply the Concept of Production cost and revenues for effective Business decision .
4. Analyze how to invest their capital and maximize returns
5. Evaluate the capital budgeting techniques.
6. Develop the accounting statements and evaluate the financial performance of business entity.

Unit 1 Managerial Economics **12**

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 2 Production and Cost Analysis **12**

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

Unit 3 Business Organizations and Markets **12**

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 4 Capital Budgeting **12**

Introduction – Nature, meaning, significance. T ypes 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, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems) .

Unit 5 Financial Accounting and Analysis **12**

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.

Prescribed Textbooks:

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

Reference Textbooks:

1. Ahuja Hl Managerial economics Schand.
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.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	PSO1	PSO2
24AMBA31T.1	1	1	1	-	1	2	-	1	1	2	1	-	-
24AMBA31T.2	2	1	1	1	1	1	1	-	1	1	1	-	-
24AMBA31T.3	1	1	-	1	2	1	1	2	1	1	1	-	-
24AMBA31T.4	1	1	-	1	1	-	1	1	-	1	1	-	-
24AMBA31T.5	-	2	1	1	-	1	-	1	1	-	1	-	-

Title of the Course: Universal Human Values-II
Category: HSM
Course Code: 24AUHV31T/24AUHV41T
Branches: AIDS, AIML,CSE(AI),CSE(AIML), CSE(DS), ECE, CE, EEE/CSE,CSE(ICB), ME
Year II
Semester: I Semester/ II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to help students recognize the vital interplay between values and skills, promoting sustained happiness and prosperity. It seeks to foster a holistic perspective on life and profession, encouraging value-based living through a clear understanding of human reality and existence. Additionally, the course emphasizes the ethical implications of such an understanding, fostering trustful behaviour, fulfilling human interactions, and a harmonious relationship with nature.

Course Outcomes:
At the end of the course, the student will be able to
1. comprehend the terms like Natural Acceptance, Happiness and Prosperity
2. analyze one's self, and one's surroundings (family, society, nature)
3. apply human values in enriching human relationships and human society.
4. analyze the need for universal human values and harmonious existence.
5. evaluate themselves as socially and ecologically responsible engineers.

Unit 1 Introduction to Value Education 12

Lecture1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture2: Understanding Value Education
Tutorial 1: Practice Session1: Sharing about oneself
Lecture 3: Self-Exploration as the Process for Value Education
Lecture4: Continuous Happiness and Prosperity – The Basic Human Aspirations
Tutorial 2: Practice Session2: Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session3: Exploring Natural Acceptance

Unit 2 Harmony in the Human Being 8

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 Session4: 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 Session5: 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 6: Exploring harmony of self with the body

Unit 3 Harmony in the Family and Society 8

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session7: Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session 8: 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 Session9: Exploring systems to fulfil human goal

Unit 4 Harmony in the Nature/Existence 10

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 10: 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 Session11: Exploring Co-existence in Existence

Unit 5 Implications of the Holistic Understanding – A Look at Professional Ethics 10

Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session 12: 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 Session13: 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 Session14: 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

Prescribed Textbooks:

1. **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.
2. 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. A. Nagaraj. *Jeevan Vidya: Ek Parichaya.* Jeevan Vidya Prakashan, Amarkantak, 1999.
2. A.N. Tripathi. *Human Values.* New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi. *The Story of My Experiments with Truth*
5. E. F Schumacher. *Small is Beautiful*

Web Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201Introduction%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%201%20Teaching%20Material/D3S2%20Respect%20July%2023.pdf
4. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
5. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%202325%20Ethics%20v1.pdf
6. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-humanvalues/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385https://onlinecourses.swayam2.ac.in/aic22_ge23/preview
7. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	**PSO1**	**PSO2**
24AUHV31T/41T.1	-	-	-	-	-	-	3	-	1	-	2	-	-
24AUHV31T/41T.2	-	-	-	-	-	-	3	-	1	-	2	-	-
24AUHV31T/41T.3	-	-	-	-	-	-	3	-	1	-	2	-	-
24AUHV31T/41T.4	-	-	-	-	-	-	3	-	1	-	3	-	-
24AUHV31T/41T.5	-	-	-	-	-	2	3	-	1	-	2	-	-

Title of the Course: Strength of Materials
Category: PCC
Semester: III Semester
Couse Code: 24ACIV31T
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To impart knowledge on the fundamental concepts of stress, strain, and elastic behavior of materials.
2. To enable students to understand and apply the concepts of flexural and shear stresses in beams and analyze the behavior of axially loaded compression members using Euler's theory
3. To develop the ability to calculate flexural and shear stresses in various structural members.
4. To provide methods for computing deflections in beams using standard techniques.
5. To introduce principal stresses and strain theories and failure theories.

Course Outcomes:

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

1. Analyze stresses and strains in materials under axial loading and determine elastic constants for various conditions.
2. Construct shear force and bending moment diagrams for beams under different loading scenarios.
3. Calculate flexural and shear stresses in various beam sections and evaluate the stability of columns using Euler's buckling theory under different end conditions.
4. Determine the slope and deflection of beams using analytical methods such as double integration and moment area method.
5. Apply theories of failure and principal stress analysis to evaluate materials and shells behaviour under complex stress conditions.

Unit 1 Simple Stresses and Strains **12**

Concept of stress and strain- Principle-Stress and Strain Diagram - Elasticity and Plasticity–Types of stresses and strains – Hooke's law–stress –strain diagram for mild steel– Working stress –Factor of safety –Lateral strain, Poisson's ratio and volumetric strain –Elastic moduli and the relationship between them– Bars of varying section –composite bars– Temperature stresses. Strain energy –Resilience –Gradual, sudden and impact –simple applications.

Unit 2 Shear Force and Bending Moment **12**

Definition and classification of beams– Concept of shear force and bending moment– S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL, UVL and combination of loads– Point of contra flexure –Relation between S.F, B.M and rate of loading at a section of a beam.

Unit 3 Flexural Stresses and Shear Stresses **12**

Flexural stresses: Theory of simple bending –Assumptions –Derivation , Neutral axis– Determination of bending stresses– section modulus of rectangular and circular sections (Solid and Hollow), I, T & C sections –Design of simple beam sections.
Shear stresses: Derivation of formula– Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and C-Sections.
Basics 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 –Limitations of Euler's theory.

Unit 4 Deflection of Beams **12**

Bending in to a circular arc– slope, deflection and radius of curvature –and Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, -UDL – Double Integration method and Moment area method.

Unit 5 Basics of Principal Stresses and Strains , Theories of Failures, Thin and Thick Shell 12

Principal stresses and strains: Basics of Stresses on an inclined section of a bar under axial loading Normal and tangential stresses on an inclined plane for biaxial stresses–Mohr's circle of stresses– Principal stresses and strains – Analytical and graphical solutions.

Theories of failures: Various Theories of failures like Maximum Principal stress theory– Maximum Principal strain theory– Maximum shear stress theory– Maximum strain energy theory –Maximum shear strain energy theory.

Basics of Thin and Thick Shells- Longitudinal and circumferential stresses.

Prescribed Textbooks:

1. Mechanics of Solid, Ferdinand Beer and others – Tata McGraw-Hill Publications 2000
2. A Text book of Strength of materials by Dr. R. K.Bansal, 4th edition,Laxmi publications, 2010.

Reference Textbooks:

1. Strength of Materials by R. Subramaniyan, Oxford University Press, 2015.
2. D.H. Young, S.P. Timoshenko " Elements of Strength of Materials" East West Press Pvt. Ltd., 5th Edition ,Reprint 2014.
3. Advanced Mechanics of Solids, L.S Srinath, McGraw Hill Education, , 3rd Edition, 2017.
4. Mechanics of Materials, Beer and Johnston, McGraw Hill India Pvt. Ltd. 8th Edition, 2020.
5. Mechanics of Solids — E P Popov, Prentice Hall, 2nd Edition, 2015.
6. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi 7th edition 2022
7. Strength of Materials by S. S. Ratan Tata Mc Grill Publications 3rd Edition, 2016.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative Teamwork	Communication	Project management and finance	Life-long learning	**PSO1**	**PSO2**
24ACIV31T.1	3	3	1	2	-	2	-	-	-	-	1	3	2
24ACIV31T.2	3	3	1	2	-	1	-	-	-	-	1	3	2
24ACIV31T.3	3	3	1	2	-	2	-	-	-	-	1	3	2
24ACIV31T.4	3	3	1	2	-	2	-	-	-	-	1	3	2
24ACIV31T.5	3	3	1	2	-	1	-	-	-	-	1	3	2

Title of the Course: Surveying and Geomatics
Category: PCC
Semester: III Semester
Couse Code: 24ACIV32T
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce the principles, classification, and tools of surveying and measurement of distances and directions using traditional instruments.
2. To develop understanding of levelling, contouring, and area/volume computations essential for engineering projects.
3. To provide knowledge and skills in the use of theodolites, traversing methods, and tacheometry for determining angles, distances, and heights.
4. To explain the geometry and setting of various curves and introduce modern surveying tools like EDM and total station.
5. To introduce photogrammetry principles, geometry of aerial photos, and mapping techniques using aerial imagery.

Course Outcomes:

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

1. Apply basic surveying principles using chains, tapes, compass, and plane table.
2. Learn the concepts and techniques of leveling and contouring, and compute areas and volumes for engineering projects involving earthworks.
3. Gain proficiency in handling theodolites, performing traversing, and applying tacheometric methods for measuring heights and distances.
4. Understand the geometry and purpose of different types of curves and explore the use of modern surveying instruments like EDM and Total Station
5. Acquire knowledge of photogrammetry techniques including aerial photography, flight planning, stereoscopy, and methods of topographic mapping.

Unit 1 Basic Concepts of surveying, Measurement of Distances and Directions 15

Basic Concepts of surveying: Introduction, concept ,purpose, Objectives, classification and principles of surveying

Measurement of Distances and Directions

Chain Surveying : Instruments for chaining , Ranging out survey lines, Errors in chaining ,Field book, Basic problems in chaining - Obstacles for chaining. List the errors and mistakes in Chain surveying and apply the corrections for measurement due to incorrect length of chain.

Prismatic Compass- Types of compass – Bearings - Whole Circle Bearing, Quadrantal Bearing, True meridian, Magnetic meridian, True bearing, Magnetic bearing, Convert Whole Circle Bearing in to Quadrantal Bearing and vice versa. Included angles– Declination - Dip and local attraction.

Plane table surveying: Introduction, accessories, setting up of plane table, techniques, testing, adjustments, errors, advantages and disadvantages

Unit 2 Levelling, Contouring and Computation of Areas & Volumes 12

Levelling - Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- Height of the Instrument Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary. Volumes - Determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

Unit 3 Theodolite Surveying, Traversing & Tacheometric Surveying 12

Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle.

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

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry, Heights and distance using tachometric principles.

Unit 4 Curves & Modern Surveying Methods **10**

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.

Unit 5 Photogrammetry Surveying **10**

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.

Prescribed Textbooks:

1. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011.
2. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010.

Reference Textbooks:

1. R. Subramanian, Surveying and Leveling, 1stEdition, Oxford University Press, New Delhi, 2010.
2. Arthur R. Benton and Philip J. Taety, Elements of Plane Surveying, 3rd Edition, McGraw Hill, 2010.
3. Arora, K. R., Surveying - Vol. I, II and III, 10th Edition, Standard Book House, Delhi, 2011.
4. Anji Reddy, M., Remote sensing and Geographical information system, B.S.Publications, 2001. 6. Arora, K.R., Surveying, Vol-I and II, Standard Book House, 2015
5. Chandra, A.M, Plane Surveying, 2nd Edition, New Age International Publishers, New Delhi, 2010.
6. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV32T.1	2	3	3	1	1	1	-	-	-	-	1	1	1
24ACIV32T.2	2	3	3	1	1	1	-	-	-	-	1	1	1
24ACIV32T.3	2	3	3	1	1	2	-	-	-	-	1	1	1
24ACIV32T.4	2	3	3	1	1	1	-	-	-	-	1	1	1
24ACIV32T.5	2	3	3	1	-	2	-	-	-	-	1	1	1

Title of the Course: Fluid Mechanics, Hydraulics and Hydraulic Machinery
Category: PCC
Semester: III Semester
Couse Code: 24ACIV33T
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce fundamental fluid properties, fluid statics concepts, and methods of pressure measurement.
2. To explain fluid kinematics and dynamics, including flow classification, governing equations, and their applications.
3. To develop understanding of flow through pipes, including energy losses, flow regimes, and pipe network analysis.
4. To study open channel flow characteristics, critical flow computation, and flow measurement techniques.
5. To familiarize students with hydraulic turbines, pumps, their working principles, design, and performance characteristics.

Course Outcomes:

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

1. Identify and explain physical properties of fluids, fluid statics principles, and analyze forces on submerged surfaces.
2. Apply fluid kinematics and dynamics principles to classify flow types and solve problems using continuity, Bernoulli, and momentum equations.
3. Analyze pipe flow systems by calculating major and minor losses, understanding laminar and turbulent flows, and solving pipe network problems.
4. Evaluate open channel flow parameters, classify flow regimes, and design hydraulic structures like weirs and notches.
5. Understand the operation and efficiency of hydraulic turbines and pumps, interpret characteristic curves, and address issues like cavitation and surge.

Unit 1 Basic Definitions and Fluid statics 12

Properties of fluids: mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapor pressure, surface tension and capillarity. Pressure measurement devices - manometers, pressure gauges.
Fluid statics: Fluid Pressure, Pressure at a point, Hydrostatic law, Pascal's law, Atmospheric, Gauge and Absolute pressure, Equation of state, Hydrostatic forces on submerged plane and curved surfaces, Total pressure and Centre of Pressure, Practical applications-Dams and Gates, Buyoyancy, Buyoyant force, Centre of Buoyancy.

Unit 2 Fluid Kinematics and Fluid Dynamics 12

Fluid Kinematics : Classification of fluid flow-Steady and Unsteady flow, Uniform and Non-uniform flow, Laminar and Turbulent flow, Rotational and Irrotational flow, One, two and three dimensional flows; Stream line, Path line and stream tube, Velocity, Acceleration and rotation of fluid particles
Fluid Dynamics : Derivation of continuity equation-one-dimensional, three dimensional; stream function, velocity potential; Flow net-uses. Euler's Equation, Bernoulli's Equation, Applications of Bernoulli's equation-Venturimeter, Orifice Meter and Pitot tube, Momentum equation, Momentum correction factor, Applications of momentum equation.

Unit 3 Flow through pipes 12

Reynold's experiment, energy losses-major and minor losses; Laws of fluid friction; Darcy-Weisbach equation, Hydraulic Grade Line and Total Energy Line; Pipes in series and parallel; Equivalent pipe, Branched pipe, Siphon, Water Hammer in pipes,
Laminar flow-Laminar flow through circular pipes-Hazen poiseuille law; Laminar flow between parallel plates-Bothplates at rest, one plate moving and other at rest, Turbulent flow-Hydrodynamically smooth and rough boundaries, resistance to flow of fluid in smooth and rough pipes, Moody'sdiagram

Unit 4 Open Channel Flow 12

Types of channels – Velocity distribution – Chezy's, Manning's and Bazin's formulae for uniform flow – Most Economical sections - Critical flow – Specific Energy - Critical depth – Computation of critical depth – Critical, subcritical and super critical flows – Velocity measuring instruments. Non uniform flow - Dynamic equation for gradually varied flow - Mild,

critical, steep, horizontal and adverse slopes – Surface profiles - Rapidly varied flow - Hydraulic jump and its applications - Energy dissipation

Weirs and notches: Flow over Notches and Weirs: Types of Notches and Weirs; Flow over - Rectangular, Triangular, Trapezoidal Notches and Weirs.

Dimensional Analysis :methods of Dimension Analysis, types of Similarities and Similarity Laws

Unit 5 Hydraulic Turbines and Centrifugal Pumps 12

Hydraulic Turbines : Layout of a typical hydropower installation-Heads and efficiencies-classification of turbines-Pelton wheel- Francis turbine-Kaplan turbine-working proportions- Velocity diagrams-Work done and efficiency- Hydraulic design, Surge tanks, Cavitation.

Centrifugal pumps: pump installation details-Heads-Losses and efficiencies-Limitation of suction lift-Work done-Minimum starting speed-Specific speed- Multistage pumps-Pumps in parallel-Performance of pumps-Characteristic curves-Net Positive Suction Head-Priming devices

Prescribed Textbooks:

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 Textbooks:

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.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV33T.1	2	2	1	1	1	1	-	-	-	-	1	2	3
24ACIV33T.2	3	3	2	2	1	-	-	-	-	-	1	3	3
24ACIV33T.3	3	2	2	2	1	-	-	-	-	-	1	3	3
24ACIV33T.4	3	3	2	3	1	-	-	-	-	-	1	2	2
24ACIV33T.5	3	3	2	3	1	1	-	-	-	-	1	2	2

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Rajampet, Annamayya District, A.P – 516126, INDIA

Title of the Course:	Strength of Materials Laboratory
Category:	PSC
Semester:	III Semester
Couse Code:	24ACIV31L
Branch/es:	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. Impart hands-on experience in testing materials under various loading conditions such as tension, compression, bending, torsion, and impact
2. Enable students to understand the mechanical behavior of engineering materials and structural members through experimental evaluation.
3. Demonstrate the practical application of theoretical principles such as stress-strain relationships, elastic constants, and deformation analysis.
4. Develop students' ability to analyze test results and draw conclusions related to strength, stiffness, and ductility of materials.
5. Promote the safe and effective use of universal testing machines, impact testers, torsion testing equipment, and other lab instruments.

Course Outcomes:

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

1. Conduct tensile, compression, torsion, bending, and hardness tests to determine the mechanical properties of metals and non-metals.
2. Analyze the load-deformation behavior of springs and beams under static loading.
3. Evaluate the impact strength of materials using Izod and Charpy tests.
4. Perform shear and deflection tests on metal specimens and structural elements.
5. Validate fundamental theorems like Maxwell's Reciprocal Theorem through experimental methods and interpret the test data accurately.

LIST OF EXPERIMENTS:

1. Tension test.
2. Bending test on Cantilever beam.
3. Bending test on simply supported beam.
4. Bending test on Continuous beam
5. Determination of torsion.
6. Hardness test.
7. Compression test on Open coiled springs
8. Tension test on Closely coiled springs
9. Compression test on wood/ concrete
10. Izod / Charpy Impact test on metals
11. Shear test of mild steel/wood
12. Maxwell Reciprocal Theorem

Note- 80 Percentage of the experiments should be covered mandatorily.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV31L.1	2	2	3	3	1	3	3	3	3	-	1	3	3
24ACIV31L.2	2	2	3	3	1	3	3	3	3	-	1	3	3
24ACIV31L.3	2	2	3	3	1	3	3	3	3	-	1	3	3
24ACIV31L.4	2	2	3	3	1	3	3	3	3	-	1	3	3
24ACIV31L.5	2	2	3	3	1	3	3	3	3	-	1	3	3

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Rajampet, Annamayya District, A.P – 516126, INDIA

Title of the Course: Surveying and Geomatics Laboratory
Category: PSC
Semester: III Semester
Couse Code: 24ACIV32L
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To provide hands-on experience in basic chain surveying techniques including closed traverse and obstacle chaining.
2. To develop competency in using compass and plane table for distance measurement and area determination.
3. To impart skills in levelling methods such as fly levelling and contouring for elevation and terrain mapping.
4. To train students in advanced angular measurements and height calculations using theodolite and tachometric principles.
5. To familiarize students with modern surveying instruments like the total station for precise measurements and plotting.

Course Outcomes:

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

1. Conduct a closed traverse chain survey and accurately plot the surveyed area.
2. Measure distances across obstacles and determine distances between inaccessible points using compass and total station.
3. Perform plane table surveys using radiation method to calculate areas of boundaries.
4. Execute fly levelling and contouring to determine heights, reduced levels, and topographic profiles.
5. Use theodolite and tachometer for precise measurement of horizontal and vertical angles, height of objects, and curve setting.

LIST OF EXPERIMENTS:

1. Survey of an area by chain survey (closed traverse) & Plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points by using compass.
4. Plane table survey: finding the area of a given boundary by the method of radiation
5. Fly levelling: Height of the Instrument Method & Rise and Fall Method
6. Determining the levels of contours by Section Method
7. Theodolite survey: Determine the horizontal angles by Repetition Method & Height of far object by vertical angles.
8. Tachometric survey: Heights and Distance problems using tachometric principles.
9. Setting Out a Simple Circular Curve by Offset Method.
10. Determination of plot area & distance between two inaccessible points by using Total Station.

Note- 80 Percentage of the experiments should be covered mandatorily.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV32L.1	3	3	2	2	2	2	2	1	3	-	1	1	1
24ACIV32L.2	3	3	2	2	2	2	2	1	3	-	1	1	1
24ACIV32L.3	3	3	2	2	2	2	2	1	3	-	1	1	1
24ACIV32L.4	3	3	2	2	2	2	2	1	3	-	1	1	1
24ACIV32L.5	3	3	2	2	2	2	2	1	3	-	1	1	1

Title of the Course: Fluid Mechanics Laboratory
Category: PSC
Semester: III Semester
Couse Code: 24ACIV33L
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To experimentally verify fundamental fluid flow principles such as Bernoulli's equation.
2. To develop skills in calibrating flow measuring devices like Venturimeter and Orifice meter.
3. To determine discharge coefficients for different hydraulic structures and flow conditions.
4. To analyze flow characteristics including friction losses and head loss in pipe fittings.
5. To understand laminar and turbulent flow regimes through Reynolds experiment.

Course Outcomes:

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

1. Verify Bernoulli's equation and explain its practical applications in fluid flow analysis.
2. Calibrate Venturimeter and Orifice meter and interpret their performance curves.
3. Calculate the coefficient of discharge for orifices, notches, and weirs under varying flow conditions.
4. Measure friction factors and head losses in pipes and pipe fittings, applying Darcy-Weisbach equation.
5. Identify laminar and turbulent flow patterns and determine the critical Reynolds number experimentally.

LIST OF EXPERIMENTS:

1. Verification of Bernoulli's equation.
2. Determination of Coefficient of discharge by using Venturimeter.
3. Determination of Coefficient of discharge by using Orifice meter.
4. Determination of Coefficient of discharge for a small orifice by constant head method.
5. Determination of Coefficient of discharge for an external mouth piece by variable head method.
6. Determination of Coefficient of discharge for contracted Rectangular Notch and /or Triangular Notch
7. Determination of Coefficient of discharge for sharp and broad crested weir
8. Determination of friction factor
9. Determination of Coefficient of loss of head in a sudden contraction.
10. Study of Reynold's Experiment.

Note- 80 Percentage of the experiments should be covered mandatorily.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV33L.1	3	3	3	3	3	3	3	2	3	-	1	3	3
24ACIV33L.2	3	3	3	3	3	3	3	2	3	-	1	3	3
24ACIV33L.3	3	2	2	2	2	3	3	3	3	-	1	3	3
24ACIV33L.4	3	2	2	2	2	3	3	3	3	-	1	3	3
24ACIV33L.5	3	3	3	3	3	3	3	3	3	-	1	3	3

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Rajampet, Annamayya District, A.P – 516126, INDIA

Title of the Course: Building Planning and Drawing
Category: SC
Semester: III Semester
Couse Code: 24ACIV34L
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:

1. To understand the objectives, scope, and applicability of building bye-laws as per local (RMC & KUDA) and national (NBC) authorities.
2. To study basic services and planning principles essential for residential building design.
3. To familiarize students with area requirements, minimum dimensions, and standards of building components as per regulations.
4. To develop skills in architectural drawing using AutoCAD, including bonds, doors, windows, and building plans.
5. To train students in 2D drafting and 3D modeling techniques for residential building components and layouts.

Course Outcomes:

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

1. Develop drawing skills for effective demonstration of detailing.
2. Draw building components using Computer Aided Design software.
3. Draw line diagram of buildings with standards and bye-laws.
4. Develop building's elevation and sections and incorporating details.
5. Develop parameters in 2D and converting to 3D

Theory

Unit-1 Building Bye laws and aspects of planning **12**

Building Bye-laws, Objectives, Scope and Applicability as per Local (RMC & KUDA) and National authority (NBC), Types of basic services in buildings.

Planning aspects of a residential building- Aspect, Prospect, Privacy, Circulation, Roominess, Grouping, Elegance, Sanitation, Flexibility, Economy List of components and functions of a residential building. Area requirements for various components. Minimum dimensions and standards as per bye-laws.

Practice Excerscises:

1. Introduction to Auto CAD
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Detailing & Drawing of Doors.
5. Detailing & Drawing of Windows.
6. Development of plan/drawing by Block editing & drafting settings.
7. Drawing of Line Diagram of Residential Buildings by using Building Bye- Laws.
8. Drawing of Plan, Elevation & Section for a Single Storey Building.
9. Drawing of Plan, Elevation & Section for Multi Storey Building.
10. Practice exercise on 3-D modeling of a building.
11. Practice exercise on 3-d modeling of types of stair cases.

Note- 80 Percentage of the experiments should be covered mandatorily.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV34L.1	3	-	-	-	3	3	3	1	-	-	1	2	2
24ACIV34L.2	3	-	-	-	3	3	3	1	-	-	1	2	2
24ACIV34L.3	3	-	-	-	3	3	3	1	-	-	1	2	2
24ACIV34L.4	3	-	-	-	3	3	3	1	-	-	1	2	2
24ACIV34L.5	3	-	-	-	3	3	3	1	-	-	1	2	2

Title of the Course	Probability and Statistics
Category	BS&H
Couse Code	24AMAT41T
Year	II Year
Semester	II Semester
Branch	CSE, AIDS, AIML, CSE (AI), CSE (DS), CSE(AIML), CSE(IOT), ME, CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Outcomes:

Upon successful completion of this course the student should be able to

1. Apply the concepts of probability theorems in stochastic process
2. Apply the probability distribution in real life problems
3. Calculate the correlation between two variables
4. Evaluate the hypotheses of large samples
5. Evaluate the hypotheses of small samples

Unit 1: Probability **10 hrs**

Probability - axioms of probability – addition theorem of probability - conditional probability-multiplication theorem of probability (without proof) - Baye's theorem.

Random variables - discrete and continuous - Distribution functions - Mean and Variance.

Unit 2: Probability distributions **8 hrs**

Probability distributions – Binomial and Poisson distribution - fitting - normal distribution - their properties.

Unit 3: Introduction of statistics **8 hrs**

Introduction of Statistics – Mean - Median and Mode for ungrouped and grouped data.

Correlation - correlation coefficient : Karl Pearson's coefficient - Spearman's rank correlation

Unit 4: Estimation and Testing of hypothesis for large samples **10 hrs**

Estimation - Point estimation - Interval estimation of one mean (small and large) - one Proportion (large).

Test of Hypothesis: Types of errors, one and two tailed tests, level of significance, single mean -difference of means - single proportion - difference of proportions (large).

Unit 5: Testing of hypothesis for small samples **8 hrs**

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. Miller and Freund, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
3. T. K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, Probability and Statistics, 2nd edition, S. Chand, 2010.

CO-PO Mapping:

CO	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and society	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24AMAT41T.1	3	2	1	2	-	-	-	-	-	-	-
24AMAT41T.2	3	2	1	2	-	-	-	-	-	-	-
24AMAT41T.3	3	2	1	2	-	-	-	-	-	-	-
24AMAT41T.4	3	3	1	2	-	-	-	-	-	-	-
24AMAT41T.5	3	3	1	2	-	-	-	-	-	-	-

Title of the Course: Building Materials and Construction
Category: ESC
Semester: IV Semester
Couse Code: 24ACIV41T
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the classification, properties, and structural requirements of various building materials including stones, wood, metals, and composites.
2. To study the physical and mechanical properties of aggregates, bricks, cement, lime, and supplementary materials used in construction.
3. To learn different types of foundations, masonry techniques, and structural components like arches, doors, and windows.
4. To gain knowledge about formwork, scaffolding, their types, erection procedures, and fire protection measures in construction.
5. To understand plastering, pointing, painting, varnishing processes, and methods for damp proofing in buildings.

Course Outcomes:

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

1. Identify and describe the characteristics and applications of common building materials such as stones, timber, metals, and plastics.
2. Evaluate the quality of aggregates, bricks, cement, and lime based on physical and chemical properties for construction suitability.
3. Select appropriate foundation types and masonry methods for different building requirements, and explain the function of arches, doors, and windows.
4. Plan and supervise safe erection of formwork and scaffolding, and apply fire protection strategies in building design.
5. Implement suitable plastering, pointing, painting, and damp proofing techniques to enhance durability and aesthetics of structures.

Unit 1 Building Materials-I **12**

Building stone: classifications, properties and structural requirements;
Wood and Wood products: Introduction to wood macrostructure, sap wood and heart wood, defects and decay of timber, seasoning and preservation of timber, fire resisting treatment, introduction to wood products- veneers, plywoods, fibre board, particle board, block board, batten boards. **Metals:** Steel: Important properties and uses of Iron (Cast iron, wroght iron and steel), Important tests on steel rebar, aluminum and copper. **Glass**: types and uses, **gypsum**: source, properties, uses; **plastic:** properties and uses, paint: types, distemper, varnish, **Adhesive**: Types, Bitumen: types, properties and tests.

Unit 2 **Building Materials-II** 12

Aggregate: Classification, Physical and mechanical properties, thermal properties of aggregate. **Bricks and Masonry Blocks**: Types, properties, field and laboratory tests to evaluate quality. **Lime**: classification, properties. **Cement:** types, Portland cement: chemical composition of raw material, bogue compounds, hydration of cement, role of water in hydration, testing of cements, **fly ash**: properties and use in manufacturing of bricks and cement.

12

Unit 3 Building Construction-I

Foundation: purpose, types of foundation- shallow, deep, pile, raft, grillage foundation**.**
Masonry: Brick Masonry: types of bonds, relative merits and demerits of English, Single Flemish and Double Flemish bond. Stone Masonry: General principles, classification of stone masonry and their relative merits and demerits. Cavity wall: components and construction
failures in buildings - Type of cracks in buildings, principal causes-moisture movement, thermal variations, elastic deformation, creep, chemical reaction.
Materials for sustainability: Energy conservation in buildings- use of recycled materials, regional materials and industrial waste products as means of sustainable development. Green Building Materials

Unit 4 Building Construction-II **12**

Form work- Types of Form work, types of materials used in form work

Scaffoldings- Types of Scaffoldings, Scaffolding Erection & dismantling, Scaffolding Inspection

Fire protection in structures- Classification of fire, general causes of fire, detection of fire, methods for fire control, Analysis for structural components for fire resistance (wood, steel, concrete and masonry).

Unit 5 Building Construction-III **12**

Plastering and Pointing: Different types of plasters and plastering process, defects in plastering.

Paints, Varnish and Distemper: Constituents, characteristics of good paints, bases, vehicles, thinners and coloring pigments. Painting of different types of surfaces varnish and its types, application. Distemper, dry and oil bound, and application of distemper.

Damp Proof Course-Causes of dampness, effects of dampness, methods of damp proofing

Prescribed Textbooks:

1. VN. Vazirani, and S.P. Chandola, Engineering Materials, Khanna Publishers 1993.
2. S.P. Arora and S.P. Bindra, Text book on Building Construction, Dhanpath Raj Publications, 1999

Reference Textbooks:

1. Kyriakos Komvopoulos, Mechanical Testing of Engineering Materials, Cognella, 2011.
2. E.N. Dowling, Mechanical Behaviour of Materials,Prentice Hall International, 2nd Edition, 1993.
3. Building materials by R.S.Rangwala,Charotar publications, 4th edition, 2019.
4. Sushil Kumar, Building Construction, Standard Publilshers 1992.
5. Gurucharan singh, Building materials and construction, Standard book house, 2023.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	**PSO1**	**PSO2**
24ACIV41T.1	2	-	-	-	-	2	2	-	-	-	2	2	2
24ACIV41T.2	2	-	-	-	-	2	2	-	-	-	2	2	2
24ACIV41T.3	3	-	-	-	-	3	2	-	-	-	2	2	2
24ACIV41T.4	3	-	-	-	-	3	2	-	-	-	2	2	2
24ACIV41T.5	3	-	-	-	-	3	2	-	-	-	2	2	2

Title of the Course: Concrete Technology
Category: PCC
Semester: IV Semester
Couse Code: 24ACIV42T
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce the basic ingredients of concrete including cement, aggregates, water, and admixtures along with their properties and standards.
2. To study the properties of fresh and hardened concrete and various methods to test and measure workability and strength.
3. To understand the concepts of elasticity, shrinkage, creep, and curing processes in concrete.
4. To learn the principles and procedures of concrete mix design as per IS and ACI standards, including quality control.
5. To explore special types of concrete such as lightweight, high-performance, fiber-reinforced, and self-compacting concretes.

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

1. Identify and characterize the essential ingredients of concrete and their effects on concrete performance.
2. Conduct and interpret tests to evaluate workability and strength of fresh and hardened concrete.
3. Analyze the effects of curing, elasticity, shrinkage, and creep on concrete behavior and durability.
4. Design concrete mixes for various applications using IS and ACI guidelines ensuring desired strength and durability.
5. Differentiate between conventional and special concretes, and select appropriate types for specific engineering applications.

Unit 1 Ingredients of Concrete **14**

Cement-chemical composition-hydration process-Bogue's compounds-Tests on properties of cement-Types of cement -I.S. Specifications. Aggregates- classification of aggregate – tests on properties of aggregates - characteristics of aggregate - I.S. Specifications. Water-quality of water - characteristics of water - I.S. Specifications. Admixtures –classification of chemical admixtures and mineral admixtures for sustainability – properties and limitations – classification of mineral admixtures – properties and limitations - I.S. Specifications

Unit 2 Properties of Concrete **14**

Fresh concrete: Manufacture of concrete-workability-factors influencing workability- measurement of workability for conventional concrete (Slump Cone, Compaction Factor and Vee-Bee test) & SCC (V-Funnel, L-Box, U- Box, Slump Flow and J–Ring).

Hardened concrete: Water/Cement Ratio(Abram's Law)-Gel Space Ratio-tests on hardened concrete-Destructive Tests (Compression, Split Tensile and Flexural)-Semi Destructive Tests (Core Cutter and Pull out test) and Non Destructive Tests (Rebound Hammer-UPV - Radiological methods)

Unit 3 Curing, Elasticity, Shrinkage and Creep **10**

Curing of concrete -methods of curing-effects of improper curing-self curing-Modulus of Elasticity-Poisson's Ratio-Dynamic, Modulus of Elasticity- Shrinkage and various types -Factors Affecting Shrinkage-Moisture Movement-Creep of Concrete Factors Influencing Creep.

Unit 4 Concrete Mix Design **10**

Proportioning of Concrete Mixes-factors influencing - IS:10262-2019 & ACI Methods- IS 456 provisions on Durability-Quality Control and Statistical Methods – Mix Design of High Strength concrete, Mix Design of SCC using EFNARC guidelines

Unit 5 Special Concretes for sustainability **10**

Light Weight Concretes - Cellular Concrete - No Fines Concrete - High Density Concrete – High Performance Concrete - Fiber Reinforced Concrete - Polymer Concrete - Self Compacting Concrete.

Prescribed Textbooks:

1. M.S. Shetty, Concrete Technology, Theory and Practice, S. Chand Publication, Sixth Edition, 2018
2. A. M. Neville Properties of Concrete, Pearson Publication – 4th Edition, 2012.

Reference Textbooks:

1. M.L. Gambhir, Concrete Technology, McGraw Hill Book Company, Fifth Edition, 2017
2. A.R. Santhakumar, Concrete Technology, Oxford University Press, New Delhi, 2018.
3. N. Krishna Raju, Design of Concrete Mixes, CBS Publishers.
4. P. K. Mehta and J. M. Monteiro, Concrete: Micro Structure, Properties and Materials Mc-Graw Hill Publishers, 3rd edition, 2006.
5. J. Prasad, C.G.K. Nair, Non-Destructive Test and Evaluation of Materials, Tata Mcgraw Hill Publishers, New Delhi, 2nd edition, 2018.
6. B.L. Gupta and A. Gupta, Concrete Technology, Jain Book Agency, 2013.
7. IS10262 (2009), Mix Design
8. IS269 (2015), Ordinary Portland Cement (33 Grade).
9. IS12269 (2013), Ordinary Portland Cement (53 Grade).
10. IS650 (1991), Specification of Standard Sand.
11. IS383 (1970), Specification for Coarse and Fine

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV42T.1	2	-	-	-	-	2	2	-	-	-	2	2	2
24ACIV42T.2	3	3	2	2	-	2	2	-	-	-	2	3	3
24ACIV42T.3	3	-	-	-	-	2	2	-	-	-	2	3	3
24ACIV42T.4	3	3	3	3	2	2	2	-	-	-	2	3	3
24ACIV42T.5	3	-	-	-	-	2	2	-	-	-	2	3	3

Title of the Course: Engineering Geology
Category: PCC
Semester: IV Semester
Couse Code: 24ACIV43T
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To introduce the fundamental concepts of geology and its significance in civil engineering projects with real-world case studies.
2. To study mineralogy and petrology including identification, classification, and properties of common minerals and rocks.
3. To understand structural geology concepts such as folds, faults, joints, and their relevance in civil engineering.
4. To examine geological hazards like earthquakes and landslides, and their impact on construction with preventive measures.
5. To explore groundwater geology, and geological considerations for the construction of dams and tunnels.

Course Outcomes:

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

1. Explain the branches of geology and apply geological knowledge to solve civil engineering problems.
2. Identify and classify minerals and rocks based on their physical properties and geological origin.
3. Analyze geological structures and assess their implications for engineering design and construction.
4. Evaluate seismic and landslide hazards and apply appropriate measures for safe construction in affected areas.
5. Assess groundwater movement and geological factors critical to the successful design and construction of dams and tunnels.

Unit 1 Introduction **10**

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 **14**

Definitions of mineral and rock, Different methods of study of mineral and rock, Physical properties of minerals and rocks for megascopic study. 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 3 Structural Geology **10**

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 **10**

Earthquakes and Land Slides: Terminology, Classification, Causes and Effects, Richter scale intensity of the Earthquakes, Precautions for building constructions in the 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- Gravity methods, Magnetic methods, Electrical methods, Seismic methods, Radiometric methods and Electrical resistivity and Seismic refraction methods and Engineering properties of rocks.

Unit 5 **Ground Water ,Geology of Dams & Tunnels** **12**

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

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

Prescribed Textbooks:

1. Engineering Geology by N. ChennaKesavulu, Laxmi Publications, 2nd Edition, 2005.

2. Engineering & General Geology by Parbin Singh Katson educational series 8th edition, 2023.

Reference Textbooks:

1. K.V.G.K. Gokhale, Principals of Engineering Geology, B.S publications, 2023.
2. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992.
3. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution, kindle edition, 2018.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	**PSO1**	**PSO2**
24ACIV43T.1	3	-	-	-	-	2	2	-	2	-	1	3	3
24ACIV43T.2	3	-	-	-	-	2	2	-	2	-	1	3	3
24ACIV43T.3	3	-	-	-	-	2	2	-	2	-	1	3	3
24ACIV43T.4	3	-	-	-	-	2	2	-	2	-	1	3	3
24ACIV43T.5	3	-	-	-	-	2	2	-	2	-	1	3	3

Title of the Course: Structural Analysis
Category: PCC
Semester: IV Semester
Couse Code: 24ACIV44T
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. To understand the behavior and analysis of fixed and continuous beams under various loading conditions including effects of support settlement and rotation.
2. To learn the application of energy theorems such as Castigliano's theorems in determining deflections of beams and trusses.
3. To study slope-deflection and moment distribution methods for analyzing continuous beams and single bay portal frames.
4. To gain proficiency in Kani's method for analyzing continuous beams and portal frames with side sway.
5. To understand the concept and construction of influence lines and analyze moving loads on beams for shear force and bending moment.

Course Outcomes:

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

1. Analyze fixed and continuous beams subjected to various loads and interpret the effects of support settlements and rotations.
2. Apply energy theorems including Castigliano's theorems to determine deflections in beams and truss structures.
3. Use slope-deflection and moment distribution methods effectively to analyze continuous beams and portal frames without sway.
4. Employ Kani's method for structural analysis of continuous beams and single-storey portal frames with side sway.
5. Construct influence lines for shear force and bending moment, and analyze beams under moving loads to find critical load positions and maximum effects.

Unit 1 **12**

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.

Unit 2 **12**

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.

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

Unit 3 **12**

Analysis of Structures by 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 4 **12**

Analysis of Structures by Moment Distribution Method: Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames without sway

Unit 5 Influence Lines and Moving Loads 12

Influence Lines: Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section single point load, U.D.L longer than the span, U.D.L shorter than the span.

Moving Loads: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single Concentrated load U.D.L longer than the span, U.D.L shorter than the span, two point loads with fixed distance between them and several point loads.

Prescribed Textbooks:

1. Analysis of Structures-VolI& Vol IIbyV.N.Vazirani& M.M.Ratwani, Khanna Publications, New Delhi, 16th edition,1994.
2. Theory of Structures by R.S. Khurmi, S. Chand Publishers, 2000.

Reference Textbooks:

1. Mechanics of Structures by S.B.Junnarkar, Charotar Publishing House, 32nd edition, 2016.
2. Theory of Structures by Gupta, Pandit& Gupta; Tat Mc.Graw– Hill Publishing Co. Ltd., New Delhi, 2023.
3. Strength of Materials and Mechanics of Structures- by B.C.Punmia, Khanna Publications, NewDelhi, 2018.
4. Introduction to structural analysis by B.D. Nautiyal, New age international publishers, NewDelhi, 2001.
5. Structural Analysis by V.D.Prasad Galgotia publications,2nd Editions.2011.
6. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi, 2011
7. Comprehensive StructuralAnalysis-Vol.I&2by Dr. R. Vaidyanathan & Dr.P.Perumal- Laxmi publications pvt.Ltd., New Delhi,4 th edition, 2006.
8. Basic structural Analysis by C.S.Reddy, Tata Mc Grawhill, New Delhi, 3rd edition, 2017.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	**PSO1**	**PSO2**
24ACIV44T.1	3	3	3	3	2	-	-	-	-	-	1	3	3
24ACIV44T.2	3	3	3	3	2	-	-	-	-	-	1	3	3
24ACIV44T.3	3	3	3	3	2	-	-	-	-	-	1	3	3
24ACIV44T.4	3	3	3	3	2	-	-	-	-	-	1	3	3
24ACIV44T.5	3	3	3	3	2	-	-	-	-	-	1	3	3

Title of the Course: Concrete Technology Laboratory
Category: PCC
Semester: IV Semester
Couse Code: 24ACIV42L
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To determine and analyze the essential properties of cement such as consistency, fineness, setting time, specific gravity, soundness, and compressive strength for quality assessment.
2. To understand the physical characteristics of bricks and fine aggregates through tests like water absorption and bulking of sand for appropriate selection in construction.
3. To evaluate the workability and behavior of fresh concrete using various methods like slump test, compaction factor test, and Vee-Bee test.
4. To gain knowledge of concrete mix design principles and determine characteristic compressive strength for different grades of concrete.
5. To explore and perform advanced concrete testing techniques such as flexural strength and non-destructive testing methods to assess the durability and strength of structural elements.

Course Outcomes:

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

1. Understand and evaluate the physical and mechanical properties of cement through tests such as normal consistency, fineness, setting time, specific gravity, soundness, and compressive strength.
2. Analyze the quality and suitability of construction materials like bricks and sand through tests such as water absorption and bulking of sand.
3. Demonstrate the ability to assess the workability and behavior of fresh concrete using slump test, compaction factor, and Vee-Bee consistency methods.
4. Design and proportion concrete mixes based on characteristic compressive strength, ensuring performance as per codal requirements.
5. Apply advanced testing techniques like flexural strength and non-destructive testing to evaluate the performance of hardened concrete and ensure structural reliability.

LIST OF EXPERIMENTS:

1. Normal Consistency of cement.
2. Fineness of cement.
3. Initial setting time and final setting time of cement.
4. Specific gravity of cement.
5. Soundness of cement.
6. Compressive strength of cement.
7. Water absorption of bricks.
8. Workability test on concrete by compaction factor, slump and Vee-bee.
9. Mix design: Concrete.
10. Mechanical and Elastic Properties of Concrete.
11. Bulking of sand.
12. Non-Destructive testing on concrete (for demonstration).

Note- 80 Percentage of the experiments should be covered mandatorily.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV42L.1	3	3	2	3	1	2	2	3	3	-	3	3	3
24ACIV42L.2	3	3	2	3	1	2	2	3	3	-	3	3	3
24ACIV42L.3	3	3	2	3	1	2	2	3	3	-	3	3	3
24ACIV42L.4	3	3	2	2	1	2	2	3	3	-	3	3	3
24ACIV42L.5	3	3	2	3	1	2	2	3	3	-	3	3	3

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Rajampet, Annamayya District, A.P – 516126, INDIA

Title of the Course:	Engineering Geology Laboratory
Category:	PCC
Semester:	IV Semester
Couse Code:	24ACIV43L
Branch/es:	CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. The objective of the course is to make the student to understand the fluid flow concepts and get familiarity with flow measuring devices.

Course Outcomes:

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

1. Identify and classify rock-forming and ore-forming minerals based on their physical and megascopic properties.
2. Recognize and describe igneous, sedimentary, and metamorphic rocks through megascopic examination of texture and mineral composition.
3. Interpret geological maps and accurately draw cross-sections showing tilted beds, faults, and unconformities.
4. Solve basic structural geology problems involving strike, dip, and thickness calculations.
5. Analyze borehole data and perform laboratory tests to evaluate rock strength for geotechnical applications.

LIST OF EXPERIMENTS:

1. Physical properties of minerals: Mega-scopic identification of Rock forming minerals
2. Physical properties of minerals: Mega-scopic identification of Ore forming minerals
3. Megascopic description and identification of Igneous rocks.
4. Megascopic description and identification of Sedimentary rocks.
5. Megascopic Description and identification of Metamorphic rocks.
6. Geological map interpretation drawing of sections for Tilted beds.
7. Geological map interpretation drawing of sections for Faults and unconformities.
8. Simple Structural Geology problems.
9. Bore hole data.
10. Strength of the rock using laboratory tests.

Note- 80 Percentage of the experiments should be covered mandatorily.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV43L.1	2	-	-	-	-	-	2	3	3	-	1	2	3
24ACIV43L.2	2	-	-	-	-	-	2	3	3	-	1	2	3
24ACIV43L.3	2	2	3	3	3	2	2	3	3	-	2	2	3
24ACIV43L.4	2	2	3	3	3	2	2	3	3	-	2	2	3
24ACIV43L.5	2	2	3	3	3	2	2	3	3	-	2	2	3

Title of the Course: Hydraulics and Hydraulic Machinery Laboratory
Category: PCC
Semester: IV Semester
Couse Code: 24ACIV45L
Branch/es: CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

1. To understand the working principles and performance characteristics of different types of hydraulic turbines and pumps.
2. To study the impact of water jets on vanes and analyze the energy transfer mechanisms involved.
3. To conduct experiments to observe and analyze hydraulic jumps and their applications.
4. To measure and evaluate the efficiency andp performance of centrifugal, reciprocating pumps and various turbines.
5. To calculate and interpret specific speed and other performance parameters of hydraulic machines.

Course Outcomes:

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

1. Demonstrate the impact of jet on vanes and relate it to practical turbine applications.
2. Analyze hydraulic jump characteristics and apply them in hydraulic engineering problems.
3. Conduct performance tests on single-stage and multi-stage centrifugal pumps and assess their efficiencies.
4. Perform efficiency tests on reciprocating pumps and different types of turbines such as Pelton, Francis, and Kaplan.
5. Calculate specific speed of turbines and interpret its significance in selecting appropriate hydraulic machines for given conditions.

LIST OF EXPERIMENTS:

1. Impact of jet on vanes.
2. Study of hydraulic jump.
3. Efficiency test on single-stage Centrifugal pump.
4. Efficiency test on Multi-stage Centrifugal pump
5. Efficiency test on Reciprocating pump.
6. Performance test on Pelton wheel turbine.
7. Performance test on Francis turbine.
8. Performance test on Kaplan turbine.
9. Specific speed of Pelton wheel turbine.

Note- 80 Percentage of the experiments should be covered mandatorily.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACIV45L.1	3	3	2	3	1	2	2	3	3	-	1	3	3
24ACIV45L.2	3	3	2	3	1	2	2	3	3	-	1	3	3
24ACIV45L.3	3	3	2	3	1	2	2	3	3	-	1	3	3
24ACIV45L.4	3	3	2	3	1	2	2	3	3	-	1	3	3
24ACIV45L.5	3	3	2	3	1	2	2	3	3	-	1	3	3

Title of the Course: Java Programming
Category: Skill Course
Couse Code: 24ACSE45L
Year II B. Tech
Semester: II Semester
Branch CE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives: This course will be able to

1. Understand the basic concepts of java programming.
2. Analyze and apply concepts like packages, interfaces, and exception handling.
3. Implement the multi-threading and GUI applications developed using JAVA

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

1. Understand the importance of datatypes, operators, functions, arrays and strings in Java Programming.
2. Apply reusability concepts like Inheritance, interfaces and packages in real time applications developed using JAVA
3. Relate the abstract class and interfaces in java programming
4. Construct and classify error and exception handling
5. Implement genetics and JavaFX basic concepts in java programs

Unit 1 Introduction to Java Programming 10

Introduction to Java: Install Java & Java IDE, First Java Program, Variables and Data Types in Java, Operators in Java, Flow Control Statements in Java, functions in java, arrays in java, Strings in java

Unit 2 Object Oriented Programming 10

Object-Oriented Programming, Classes and Objects, Encapsulation, Abstraction, Inheritance, polymorphism.

Unit 3 Packages and Interfaces 10

Packages and Interfaces: Packages, Defining a Package, A Short Package Example, Access Protection, an Access Example, Importing Packages.Abstract keyword, Interfaces: Defining an Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces, Interfaces Can Be Extended

Unit 4 Exception Handling and Multithreaded Programming 10

Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Displaying a Description of an Exception, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Built-in Exceptions

Multithreaded Programming: The Java Thread Model, Thread Priorities, Synchronization, Messaging, The Thread Class and the Runnable Interface, The Main Thread, Creating a Thread, Implementing Runnable, Extending Thread, Choosing an Approach, Creating Multiple Threads

Unit 5 Generics and JavaFX Basics 10

Generics: What Are Generics, Generics Work Only with Reference Types, A Generic Class with Two Type Parameters, The General Form of a Generic Class.

JavaFX Basic Concepts, Using Image and Image View, Button, Radio Button, CheckBox, TextField

Prescribed Text Book:

1. Herbert Schildt.Java. The complete reference, TMH, 9th Edition

Reference Books:

1. Nino and F.A. Hosch, An Introduction to programming and OO design using Java, John Wiley & sons.

2. Y. Daniel Liang, Introduction to Java programming, Pearson Education. 6th Edition
3. R.A. Johnson- Thomson, An introduction to Java programming and object-oriented Application Development

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
24ACSE36L-1	3	3	-	-	-	-	-	-	-	-	-	-	2	-
24ACSE36L-2	-	3	3	2	-	-	-	-	-	-	-	-	3	-
24ACSE36L-3	3	3	3	2	-	-	-	-	-	-	3	3	2	-
24ACSE36L-4	3	3	3	-	-	-	-	-	-	-	3	3	3	-
24ACSE36L-5	3	3	3	-	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA UNIVERSITY

EXCELLENCE IN EDUCATION; SERVICE TO SOCIETY

(ESTD, UNDER AP PRIVATE UNIVERSITIES (ESTABLISHMENT AND REGULATION) ACT, 2016)

Rajampet, Annamayya District, A.P – 516126, INDIA

Title of the Course:	Environmental Science
Category:	MC
Course Code:	24AENS31T/41T
Branches:	CSE, CSE(AIML), CSE(IOT), EEE, ME / CSE(AI), AIML, CSE(DS), AIDS, CE & ECE
Year	II
Semester:	I Semester/II Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	-	-	-

Course Objectives: This course aims to raise environmental awareness, promote sustainable practices aligned with the Sustainable Development Goals (SDGs), and highlight the significance of ecosystems and biodiversity. It sensitizes students to major pollution issues and related legislative measures, fosters ethical responsibility and problem-solving skills to tackle environmental challenges, and explains the impact of human population growth on the environment and public health. The course also emphasizes the role of education, information technology, and public policy in promoting environmental sustainability.

Course Outcomes:

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

1. explain how natural resources should be utilised with a focus on sustainability.
2. describe the need to protect ecosystems and biodiversity for future generations.
3. comprehend major pollution problems related to ecosystems.
4. Summarize key environmental issues, sustainable practices, and laws supporting environmental protection in the context of sustainable development goals.
5. explain the effects of population growth on environment and health, and the role of education, IT, and welfare programs in managing them.

Unit 1 Natural resources **7**

Natural Resources: Renewable and non-renewable resources – Forest resources: Uses, deforestation – Water resources: Uses, floods, drought – Mineral resources: Uses, environmental effects of extracting mineral resources– Energy resources: Renewable and non-renewable energy sources (overview only).

Unit 2 Ecosystems, Biodiversity and its conservation **6**

Ecosystems: Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and functions of the following ecosystems: Forest ecosystem and lake ecosystem.
Biodiversity and its conservation: Definition – Values of biodiversity – Hot-spots of biodiversity – Threats to biodiversity – Conservation of biodiversity.

Unit 3 Environmental pollution **5**

Definition, causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.
Self-learning: Genetically modified crops

Unit 4 Social issues and the Environment **6**

Sustainable development – Rainwater harvesting – Environmental ethics – Climate change, global warming, acid rain, ozone layer depletion – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Environment Protection Act.

Unit 5 Human population and the Environment **6**

Population explosion – Family welfare programmes – Environment and human health – Value education – Role of information technology in environment and human health, Field work – Visit to a local area to document environmental assets.

Prescribed Textbooks:

1. Kaushik, Anubha, and C. P. Kaushik. *Perspectives in Environmental Studies*. 7th ed., New Age International Publishers, 2022.
2. Chawla, Shashi. *A Textbook of Environmental Studies*. 1st ed., McGraw Hill Education, 2017.

Reference Books:

1. Joseph, Benny. *Environmental Studies*. 3rd ed., McGraw Hill Education India, 2017.
2. Dhinakaran, A., and Sankaran, B. *A Textbook of Environmental Studies*. 1st ed., Himalaya Publishing House, 2023.
3. Basu, Mahua, and Xavier, S. *Fundamentals of Environmental Studies*. 1st ed., Cambridge University Press, 2017.
4. Bharucha, Erach. *Textbook of Environmental Studies for Undergraduate Courses*. 3rd ed., Universities Press (India), 2021.
5. Tiwari, Vijay Kumar. *A Textbook of Environmental Studies*. 1st ed., Himalaya Publishing House, 2024.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24AENS31T/41T.1	2	2	-	-	-	-	2	-	-	-	2
24AENS31T/41T.2	2	2	-	-	-	-	2	-	-	-	2
24AENS31T/41T.3	2	2	-	-	-	-	2	-	-	-	2
24AENS31T/41T.4	3	2	-	-	-	-	2	-	-	-	3
24AENS31T/41T.5	2	2	-	-	-	-	2	-	-	-	2