B.TECH. –CIVIL ENGINEERING

II YEAR COURSE STRUCTURE & SYLLABI

B.Tech.– II Year I Semester

S.No.	Category	Course Code	Title	L	T	P	Credits
1	BS&H	23AHS33T	Numerical and Statistical Methods	3	0	0	3
2	BS&H	23AHS35T	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
3	ES	23A131T	Surveying	3	0	0	3
4	PC	23A132T	Strength of Materials	3	0	0	3
5	PC	23A133T	Fluid Mechanics	3	0	0	3
6	PC	23A131L	Surveying Lab	0	0	3	1.5
7	PC	23A132L	Strength of Materials Lab	0	0	3	1.5
8	SEC	23A134L	Building Planning and Drawing	0	1	2	2
9	MC	23AHS39T	Environmental Science	2	0	0	-
			Total	16	02	08	20

B.Tech. II Year II Semester

S.No.	Category	Course Code	Title	L	T	P	Credits
1	ME-1	23AHS46T 23AHS47T 23AHS48T	Managerial Economics and Financial Analysis Organizational Behavior Business Environment	2	0	0	2
2	ES	23A141T	Engineering Geology	3	0	0	3
3	PC	23A142T	Concrete Technology	3	0	0	3
4	PC	23A143T	Structural Analysis	3	0	0	3
5	PC	23A144T	Hydraulics & Hydraulic Machinery	3	0	0	3
6	PC	23A142L	Concrete Technology Lab	0	0	3	1.5
7	PC	23A141L	Engineering Geology Lab	0	0	3	1.5
8	SEC	23A145L	Skills in Civil Engineering software. (STAADPRO/ETABS/CAD/REVIT/SAP)	0	1	2	2
9	ES	23AHS48T	Design Thinking &Innovation	1	0	2	2
			Total	15	1	10	21
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation							

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course: Numerical & Statistical Methods
Category: BS&H
Couse Code: 23AHS33T
Branch/es: Civil Engineering
Semester: III Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:
1. To introduce Numerical methods for solving algebraic and transcendental equations
2. To notify the numerical methods in Interpolation.
3. To introduce the numerical solutions of ordinary differential equations.
4. To introduce the concepts of estimation, hypothesis and large samples.
5. To explain the steps of learning of hypothesis for small samples.

Course Outcomes:
At the end of the course, the student will be able to
1. solve algebraic and transcendental equations using   numerical methods.
2. apply interpolation technique in engineering.
3. solve the ordinary differential equations using numerical methods.
4. evaluate the hypothesis of large samples
5. evaluate the hypothesis of small samples.

Unit 1   Solution of Algebraic & Transcendental Equations   8
Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method

Unit 2   Interpolation   8
Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.

Unit 3   Solution of Initial value problems to Ordinary differential equations   8
Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's and modified Euler's methods-Runge-Kutta methods (second and fourth order).

Unit 4   Estimation and Testing of hypothesis, large sample tests   10
Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

Unit 5   Small sample tests   10
Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), $\chi2$ - test for goodness of fit, $\chi2$ - test for independence of attributes.

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

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

Online Learning Resources:
1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc24_ma05/preview
3. http://nptel.ac.in/courses/111105090

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modem tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2	PSO3
23AHS33T.1	3	2	1	2	-	-	-	-	-	-	-	1	-	-	-
23AHS33T.2	3	2	1	2	-	-	-	-	-	-	-	1	-	-	-
23AHS33T.3	3	2	1	2	-	-	-	-	-	-	-	1	-	-	-
23AHS33T.4	3	3	2	3	-	-	-	-	-	-	-	1	-	-	-
23AHS33T.5	3	3	2	3	-	-	-	-	-	-	-	1	-	-	-

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Title of the Course: Universal Human Values – Understanding Harmony and Ethical Human Conduct
Category: BS&H
Couse Code: 23AHS35T   23AHS45T
Branch/es: ME, CE, ECE,CSE(DS) and AI &DS   EEE, CSE, CSE(AI) & AIML
Semester: III Semester   IV Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	1	-	3

Course Objectives:

1. To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity.

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 ultimately 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:

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   9

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   9

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

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   6

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   9
            Ethics**

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:
Textbook and Teachers Manual

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. Jeevan Vidya: Ek Parichaya, A. Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

5.   Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

6.   The Story of Stuff (Book).

7.   The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

8.   Small is Beautiful - E. F Schumacher.

9.   Slow is Beautiful - Cecile Andrews

10. Economy of Permanence - J C Kumarappa

11. Bharat Mein Angreji Raj – Pandit Sunderlal

12. Rediscovering India - by Dharampal

13. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi

14. India Wins Freedom - Maulana Abdul Kalam Azad

15. Vivekananda - Romain Rolland (English)

13.   Gandhi - Romain Rolland (English)

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%202023.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/62490385

https://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	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and	Life-long learning	PSO1	PSO2	PSO3
23AHS35T/45T.1	-	-	-	-	-	-	-	3	-	1	-	2	-	-	-
23AHS35T/45T.2	-	-	-	-	-	-	-	3	-	1	-	2	-	-	-
23AHS35T/45T.3	-	-	-	-	-	-	-	3	-	1	-	2	-	-	-
23AHS35T/45T.4	-	-	-	-	-	-	2	3	-	1	-	2	-	-	-
23AHS35T/45T.5	-	-	-	-	-	2	3	3	-	1	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course: SURVEYING
Category: Engineering Science
Couse Code: 23A131T
Branch/es: Civil Engineering
Semester: III

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

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

Course Outcomes:
At the end of the course, the student will be able to
1. Apply the principle and methods of surveying and measuring of horizontal and vertical- distances and angles
2. Identify the source of errors and rectification methods
3. Apply surveying principles to determine areas and volumes
4. Setting out curves and using modern surveying equipment's
5. Apply the basics of Photogrammetry Surveying in field

Unit 1   12
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 2   8
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 3   8
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 4   10

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

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

Unit 5   10

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.

Prescribed Textbooks:
1.   Surveying (Vol – 1 & 2) by Duggal S K,   Tata McGraw Hill Publishing Co. Ltd. New
Delhi, 5th edition, 2019.
2.   Textbook of Surveying by C Venkatramaiah , Universities Press 1st Edition, 2011
    Reference Books:
1. Surveying (Vol – 1), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -
    Laxmi Publications (P) ltd., New Delhi, 18th edition 2024.
2. Surveying (Vol – 2), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -
    Laxmi Publications (P) ltd., New Delhi 17th 2022.
3. Surveying (Vol – 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -
    Laxmi Publications (P) ltd., New Delhi 16th 2023.
4. Plane Surveying and Higher Surveying‖ by Chandra A M, New age International
     Pvt. Ltd.,Publishers, New Delhi, 3rd Edition, 2015.

5. Surveying and Levelling by N.Basak Tata McGraw Hill Publishing Co. Ltd. New
     Delhi, 4th edition, 2014.
6. Surveying (Vol 1, 2 & 3), by Arora K R, Standard Book House, Delhi. Edition: 12th,
     2015.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of	Conduct investigations	Modern tool usage	The engineer and society	Environment and	Ethics	Individual and team work	Communication	Project management	Life-long learning	PSO1	PSO2	PSO3
CO1	3	2	-	2	-	-	1	-	-	2	1	3	3	1	1
CO2	2	1	-	1	-	-	1	-	-	1	1	2	3	1	1
CO3	2	2	-	1	-	-	1	-	-	2	1	2	3	2	2
CO4	1	2	-	1	-	-	1	-	-	2	1	1	3	2	2
CO5	2	1	-	2	-	-	1	-	-	1	1	2	3	2	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course: STRENGTH OF MATERIALS
Category: Professional Core
Couse Code: 23A132T
Branch/es: Civil Engineering
Semester: III

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:

1. To impart Fundamental concepts of Strength of Material and Principles of Elasticity and Plasticity Stress
2. To impart concepts of shear force and bending moment on various types of beams and loading conditions
3. To impart concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections.
4. 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
1. To understand the basic materials behavior under the influence of different
2. external loading conditions and the support conditions.
3. To draw the diagrams indicating the variation of the key performance features
4. like axial forces, bending moment and shear forces in structural members.
5. To acquire knowledge of bending concepts and calculation of section modulus

Unit 1   Simple Stresses and Strains   12

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

Unit 2   Shear Force and Bending Moment   8

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

Unit 3   Flexural and Shear Stresses   8

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

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

Torsion – circular shafts only

Unit 4   Deflection of Beams   10

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

Unit 5   10

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

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

   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).
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, NewDelhi 7th edition 2022
6. Strength of Materials by S.S.Ratan Tata McGrill Publications 3rd Edition , 2016

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	PSO3
CO1	3	2	-	2	-	-	-	-	-	2	1	3	3	1	
CO2	2	1	-	1	-	-	-	-	-	1	1	2	3	1	
CO3	2	2	-	1	-	-	-	-	-	2	1	2	3	2	
CO4	1	2	-	1	-	-	-	-	-	2	1	1	3	2	
CO5	2	1	-	2	-	-	-	-	-	1	1	2	3	2	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course: FLUID MECHANICS
Category: Professional Core
Couse Code: 23A133T
Branch/es: Civil Engineering
Semester: III

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

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

Course Outcomes:
At the end of the course, the student will be able to
1. Understand the principles of fluid statics, kinematics and dynamics
2. Apply the laws of fluid statics and concepts of buoyancy
3. Understand the fundamentals of fluid kinematics and differentiate types of fluid flows
4. Apply the Principle of conservation of energy for flow measurement.
5. Analyse the losses in pipes and discharge through pipe network.

Unit 1 12
Basic concepts and definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; Variation of viscosity with temperature, Newton law of viscosity; Vapor pressure, Boiling point, Surface tension, Capillarity, Bulk modulus of elasticity, Compressibility

Unit 2 Fluid statics 8
Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies

Unit 3   Fluid kinematics 8
Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one-, two- and three-dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three - Dimensional continuity equations in Cartesian coordinates.

Unit 4   Fluid Dynamics   10

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

Unit 5   Analysis of Pipe Flow   10

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.

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 2(

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

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	PSO3
CO1	3	1	-	-	-	2	-	-	1	-	1	1	3	1	1
CO2	3	3	-	-	-	2	-	-	3	-	3	3	3	1	1
CO3	3	1	-	-	-	3	-	-	1	-	1	1	3	2	2
CO4	3	2	-	-	-	1	-	-	2	-	2	2	3	2	2
CO5	3	3	-	-	-	2	-	-	3	-	3	3	3	2	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course: SURVEYINGLAB
Category: Professional Core
Couse Code: 23A131L
Branch/es: Civil Engineering
Semester: III

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:
- Know about various linear and angular measuring instruments
- Take Measurements in the linear and angular view
- Determine the area and volume by interpreting the data obtained from surveying activities
- Know modern equipment such as total station
- Draft field notes from survey data

Course Outcomes: At the end of the course, the student will be able to
1. Handle various linear and angular measuring instruments
2. Measure the linear and angular measurements
3. Calculate the area and volume by interpreting the data obtained from surveying activities
4. Handle modern equipment such as total station
5. Prepare field notes from survey data

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

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and	Life-long learning	PSO1	PSO2	PSO3
CO 1	2	2	-	2	1	-	-	-	3	2	2	2	2	-	-
CO 2	2	2	-	2	1	-	-	-	3	3	3	2	2	-	-
CO 3	2	2	-	2	1	-	-	-	3	2	2	2	2	-	-
CO 4	1	2	-	-	3	-	-	-	3	2	2	1	1	-	-
CO5	2	1	-	-	-	-	-	-	3	2	2	1	1	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course: STRENGTH OF MATERIALS LAB
Category: Professional Core
Couse Code: 23A132L
Branch/es: Civil Engineering
Semester: III

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:
- To determine the tensile strength and yield parameters of mild steel
- To find out flexural strengths of Steel/Wood specimens and measure deflections
- To determine the torsion parameters of mild steel bar
- To determine the hardness numbers, impact and shear strengths of metals
- To determine the load-deflection parameters for springs

Course Outcomes:
At the end of the course, the student will be able to
1. Conduct tensile strength test and draw stress-strain diagrams for ductile metals
2. Perform bending test and determine load-deflection curve of steel/wood
3. Able to conduct torsion test and determine torsion parameters
4. Perform hardness, impact and shear strength tests and calculate hardness numbers, impact and shear strengths
5. Able to conduct tests on closely coiled and open coiled springs and calculate deflections

LIST OF EXPERIMENTS:

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

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	PSO3
CO 1	2	2	-	-	3	3	3	-	-	3	-	-	3	3	2
CO 2	2	2	-	-	3	3	3	-	-	3	-	-	3	3	1
CO 3	2	2	-	-	3	3	3	-	-	3	-	-	3	3	2
CO 4	2	2	-	-	3	3	3	-	-	3	-	-	3	3	1
CO5	2	2	-	-	3	3	3	-	-	3	-	-	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course: BUILDING PLANNING AND DRAWING
Category: Skill Enhancement Course
Couse Code: 23A134L
Branch/es: Civil Engineering
Semester: III

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:
- Initiating the student to different building bye-laws and regulations.
- Imparting the planning aspects of residential buildings and public buildings.
- Giving training exercises on various signs and bonds.
- Giving training exercises on different building units.
- Imparting the skills and methods of planning of various buildings.

Course Outcomes: At the end of the course, the student will be able to
1. Plan various buildings as per the building by-laws.
2. Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
3. Draw signs and bonds
4. Draw different building units
5. Learn the skills of drawing building elements and plan the buildings as per requirements.

LIST OF 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.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and	Life-long learning	PSO1	PSO2	PSO3
CO1	1	1	2	-	-	3	3	2	-	2	2	2	3	-	2
CO2	1	1	2	-	-	3	2	-	-	2	1	1	-	-	-
CO3	1	1	2	-	-	3	3	2	-	2	2	2	3	1	1
CO4	1	1	2	-	-	3	3	2	-	2	2	2	3	1	1
CO5	1	1	2	-	-	3	3	2	-	2	2	2	3	1	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course: ENVIRONMENTAL SCIENCE
Category: Mandatory Courses
Couse Code: 23AHS37T
Branch/es: Civil Engineering
Semester: III

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:
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

1. To make the student to get awareness on environment and understand the importance of protecting natural resources.
2. To enable the student to know the importance of ecosystems and biodiversity for future generations.
3. To make the student to know pollution problems due to the day-to-day activities of human life.
4. To enable the student to acquire skills for identifying and solving the social issues related to environment.
5. To enable the student to understand the impact of human population on the environment.

Unit 1   12
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 2   8
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:
    a.   Forest ecosystem.
    b.   Grassland ecosystem
    c.   Desert ecosystem.
    d.   Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use,

Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-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 3 8
Environmental Pollution: Definition, Cause, effects and control measures of :
a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

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

Unit 4 10
Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

Unit 5 10
Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.
Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Prescribed Textbooks:
1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S.Azeem Unnisa, "Environmental Studies" Academic Publishing Company
4.K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.
Reference Books:
1. Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
2. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.

4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited
5. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of	Conduct investigations	Modern tool usage	The engineer and society	Environment and	Ethics	Individual and team work	Communication	Project management	Life-long learning	PSO1	PSO2	PSO3
CO1	1	1	-	-	-	3	3	1	-	-	-	3	3	-	2
CO2	1	2	-	-	-	3	3	1	-	-	-	3	-	-	-
CO3	1	1	-	-	-	3	3	1	-	-	-	3	3	1	1
CO4	1	1	-	-	-	3	3	1	-	-	-	3	3	1	1
CO5	1	1	-	-	-	3	3	1	-	-	-	3	3	1	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

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Title of the Course: MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Category: HSSM

Couse Code: 23AHS36T   23AHS46T

Branch/es: EEE, ECE, CSE, CSE (AI),   ME, CE, CSE (DS), AIDS
AIML

Semester: III Semester   IV Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	0	2

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(L2)
2. Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (L2)
3. Apply the Concept of Production cost and revenues for effective Business decision (L3)
4. List features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI and IRR methods of Capital Budgeting and compute rank of the projects. L3
5. Develop the accounting statements and evaluate the financial performance of business entity (L5)

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   8
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 3   Business Organizations and Markets   8
 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   10
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 B.Tech. Civil Engineering JNTUA R23 Regulations Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

Unit 5   Financial Accounting and Analysis   10
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:
4.   Gupta: Managerial Economics, TMH, 2009
5.   Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003
6.   Mehta P.L., Managerial Economics-Analysis, Problems, Cases, S Chand and Sons,New Delhi, 2001.
7.   M.E.Thukaram Rao., Accounting for Managers, New Age International Publishers.
8.   T.S, Reddy and Y. Hari Prasad Reddy, Accounting and Financial Management, Margham
     Publications.

Reference Books:
16. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
17. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Edition.
18. Suma Damodaran, Managerial Economics, Oxford University Press.
19. Lipsey & Chrystel, Economics, Oxford University Press.
20.   Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition,Thomson.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and	Life-long learning	PSO1	PSO2
23AHS36T/46T.1	2	-	-	-	2	-	2	-	2	-	-	-	-	2
23AHS36T/46T.2	-	3	2	3	-	-	-	-	-	1	2	-	2	-
23AHS36T/46T.3	2	-	2	-	2	-	2	2	-	1	3	2	-	2
23AHS36T/46T.4	-	2	-	2	-	-	-	-	2	-	-	-	1	-
23AHS36T/46T.5	2	2	-	2	-	-	2	-	-	-	-	1	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course: ORGANISATIONAL BEHAVIOUR

Category: HSSM

Couse Code: 23AHS37T   23AHS47T

Branch/es: EEE, ECE, CSE, CSE (AI), AIML ME, CE, CSE (DS), AIDS

Semester: III Semester   IV Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	-	-	2

Course Objectives:
1. To enable student's comprehension of organizational behavior
2. To offer knowledge to students on self-motivation, leadership and management
3. To facilitate them to become powerful leaders
4. To Impart knowledge about group dynamics
5. To make them understand the importance of change and development

Course Outcomes:
At the end of the course, the student will be able to
1. Define the Organizational Behaviour, its nature and scope. (L2)
2. Apply theories of motivation to analyze the performance problems (L3)
3. Summarize about the organizational culture(L2)
4. Evaluate group dynamics (L5)
5. Comprehend about the organizational change and development (L2)

Unit 1 Introduction to Organizational Behavior   12
Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective - Understanding Individual Behaviour –Attitude -Perception - Learning – Personality

Unit 2 Motivation and Leading   8
Motivation and Leading Theories of Motivation- Maslow's Hierarchy of Needs - Hertzberg's Two Factor Theory - Vroom's theory of expectancy – Mc Cleland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory.

Unit 3 Organizational Culture   8
Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory– Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management -Evaluating Leader.

Unit 4 Group Dynamics   10
Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of group behaviour - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization– Conflict resolution

Unit 5 Organizational Change and Development   10
Introduction –Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

Prescribed Textbooks:

1 Luthans, Fred, OrganisationalBehaviour, McGraw-Hill, 12 Th edition
2. P Subba Ran, OrganisationalBehaviour, Himalya Publishing House.

Reference Books:
1 McShane, Organizational Behaviour, TMH
2. Nelson, Organizational Behaviour, Thomson.
3. Robbins, P. Stephen, Timothy A. Judge, Organizational Behaviour, Pearson.
4. Aswathappa, Organizational Behaviour, Himalaya.

CO-PO Mapping

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Modem tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2
23AHS37T/47T.1	2	3	2	2	2	1	2	-	1	-	1	1	-	1
23AHS37T/47T.2	3	3	3	3	3	1	-	1	2	1	1	1	-	-
23AHS37T/47T.3	2	3	2	2	2	1	-	-	-	1	-	1	-	1
23AHS37T/47T.4	3	3	3	3	3	-	-	1	3	1	1	-	-	-
23AHS37T/47T.5	2	3	2	2	2	-	-	-	-	-	1	2	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course: BUSINESS ENVIRONMENT

Category: HSSM

Couse Code: 23AHS38T   23AHS48T

Branch/es: EEE, ECE, CSE (AI),   ME, CE, CSE (DS), AIDS
AIML

Semester: III Semester   IV Semester

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	-	-	2

Course Objectives:
1. To make the student to understand about the business environment
2. To enable them in knowing the importance of fiscal and monitory policy
3. To facilitate them in understanding the export policy of the country
4. To Impart knowledge about the functioning and role of WTO
5. To Encourage the student in knowing the structure of stock markets

Course Outcomes:
At the end of the course, the student will be able to
1. Define Business Environment and its Importance.
2. Evaluate fiscal and monetary policy
3. Analyze India's Trade Policy
4. summarizes about World Trade Organization
5. Apply the knowledge of Money markets and capital markets in future investment

Unit 1   Overview of Business Environment   12
Introduction – meaning Nature, Scope, significance, functions and advantages. Types Internal &External, Micro and Macro. Competitive structure of industries -Environmental analysis- advantages & limitations of environmental analysis.

Unit 2   Fiscal & Monetary Policy   8
Introduction – Nature, meaning, significance, functions and advantages. Public Revenues - Public Expenditure - Evaluation of recent fiscal policy of GOI. Highlights of Budget Monetary Policy - Demand and Supply of Money –RBI -Objectives of monetary and credit policy - Recent trends- Role of Finance Commission.

Unit 3   India's Trade Policy   8
 Introduction – Nature, meaning, significance, functions and advantages. Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - Balance of Payments– Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

Unit 4   World Trade Organization   10
Introduction – Nature, significance, functions and advantages. Organization and Structure - Role and functions of WTO in promoting world trade - GATT -Agreements in the Uruguay Round –TRIPS, TRIMS - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

Unit 5   Money Markets and Capital Markets   10

 Introduction – Nature, meaning, significance, functions and advantages. Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI – Stock Exchanges - Investor protection and role of SEBI, Introduction to international finance.

Prescribed Textbooks:

1. Francis Cherunilam, International Business: Text and Cases, Prentice Hall of India.
2. K. Aswathappa, Essentials of Business Environment: Texts and Cases & Exercises 13th Revised Edition.HPH

Reference Books:

 1. K. V. Sivayya, V. B. M Das, Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
 2. Sundaram, Black, International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
 3. Chari. S. N, International Business, Wiley India.
 4. E. Bhattacharya, International Business, Excel Publications, New Delhi.

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
23AHS38T/48T.1	1	3	1	1	1	1	2	-	-	-	1	1	-	-
23AHS38T/48T.2	3	3	3	3	3	2	-	-	-	-	-	1	-	1
23AHS38T/48T.3	3	3	3	3	3	-	2	-	-	-	-	1	-	2
23AHS38T/48T.4	1	3	1	1	1	-	-	-	-	-	-	1	-	1
23AHS38T/48T.5	3	3	3	3	3	-	2	-	-	-	-	1	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course: ENGINEERING GEOLOGY
Category: Engineering Science
Couse Code: 23A141T
Branch/es: Civil Engineering
Semester: III

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

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

Course Outcomes:
At the end of the course, the student will be able to
1. Understand the significance of geological agents on Earth surface and its significance in Civil Engineering.
2. Identify and understand the properties of Minerals and Rocks.
3. Understand the concepts of Groundwater and its geophysical methods.
4. Classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard zonation.
5. Investigate the project site for mega/mini civil engineering projects and site selection for mega engineering projects like Dams, Reservoirs and Tunnels.
6. Understand the significance of geological agents on Earth surface and its significance in Civil Engineering.

Unit 1   Introduction   12
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   8
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 3   Structural Geology   8
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
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 5   10
Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful constructions of reservoirs, Life of Reservoirs. Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

Prescribed Textbooks:
1. Engineering Geology by N. ChennaKesavulu, Laxmi Publications . 2ndEdn 2014.
2. Engineering & General Geology by Parbin Singh Katson educational series 8th2023

Reference Books:
1. K. V. Sivayya, V. B. M Das, Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black, International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
3. Chari. S. N, International Business, Wiley India.
4. E. Bhattacharya, International Business, Excel Publications, New Delhi.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and	Life-long learning	PSO1	PSO2	PSO3
CO1	3	3	-	-	3	-	-	3	2	-	2	-	-	-	-
CO2	3	3	3	2	-	-	-	2	3	-	-	-	-	-	-
CO3	2	2	-	3	-	-	-	3	2	-	-	-	-	-	-
CO4	-	-	3	-	3	-	-	2	2	2	3	-	-	-	-
CO5	-	-	2	2	2	-	-	3	2	3	2	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course: CONCRETE TECHNOLOGY
Category: Professional Core
Couse Code: 23A142T
Branch/es: Civil Engineering
Semester: IV

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:
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
1. Familiarize the basic ingredients of concrete and their role in the production of concrete and its behavior in the field.
2. Test the fresh concrete properties and the hardened concrete properties. Understand the basic concepts of concrete. Design the concrete mix by BIS method.
3. Evaluate the ingredients of concrete through lab test results, realise the importance of quality of concrete

4. Understand the behavior of concrete in various environments.

 5.Familiarize the basic concepts of special concrete and their production and applications.

Unit 1   12
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 2   8
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 3   8

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 4   10

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 5   10

MIX DESIGN AND SPECIAL CONCRETES: Ready mixed concrete, Fibre reinforced concrete – Different types of fibres – Factors affecting properties of FRC, High performance concrete – Self consolidating concrete, Self-healing concrete. Factors in the choice of mix proportions –Quality control of concrete- Statistical methods- Acceptance Criteria-Concepts Proportioning of concrete mixes by ACI method and IS Code method.

Prescribed Textbooks:
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

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of	Conduct investigations	Modern tool usage	The engineer and society	Environment and	Ethics	Individual and team work	Communication	Project management	Life-long learning	PSO1	PSO2	PSO3
CO1	1	3	2	3	-	2	3	-	2	-	-	-	2	3	2
CO2	1	3	2	3	-	2	3	-	2	-	-	-	2	3	2
CO3	1	3	2	3	-	2	3	-	2	-	-	-	2	3	2
CO4	1	3	2	2	-	2	3	-	2	-	-	-	2	3	2
CO5	1	3	2	2	-	2	3	-	2	-	-	-	2	3	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course: STRUCTURAL ANALYSIS
Category: Professional Core
Couse Code: 23A143T
Branch/es: Civil Engineering
Semester: IV

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:
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
1. Apply energy theorems to analyze trusses
2. Analyze indeterminate structures by using Castigliano's–II theorem
3. Analysis of fixed and continuous beams
4. Analyze continuous beams and portal frames by using slope-deflection method
5. Analyze continuous beams and portal frames by using

Unit 1   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 and pin jointed trusses.

Unit 2   8
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   8
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.

Unit 4   10
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 5 10

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.

Prescribed Textbooks:
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 Publication New Delhi.

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	PSO3
CO1	2	3	3	3	-	3	-	-	3	-	-	3	3	3	-
CO2	2	3	3	3	-	3	-	-	3	-	-	3	3	1	-
CO3	2	3	3	3	-	3	-	-	3	-	-	3	3	1	-
CO4	2	3	3	3	-	3	-	-	3	-	-	3	3	1	-
CO5	2	3	3	3	-	3	-	-	3	-	-	3	3	1	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course:	HYDRAULICS AND HYRAULIC MACHINERY
	(Pre-requisite: Fluid Mechanics)
Category:	Professional Core
Couse Code:	23A144T
Branch/es:	Civil Engineering
Semester:	IV

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

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

Course Outcomes:
At the end of the course, the student will be able to
1. Understand the characteristics of laminar and turbulent flows.
2. Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels.
3. Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows.
4. Evaluate the performance of impact of jets on plates and design Pelton wheel, Francis
5. Understand the principles, losses and its efficiencies of centrifugal pumps

Unit 1 12
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 2 8
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 3 8
Non-Uniform flow in Open Channels: Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy dissipation.

Unit 4   10

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 5   10

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

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 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

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of	Conduct investigations	Modern tool usage	The engineer and society	Environment and	Ethics	Individual and team work	Communication	Project management	Life-long learning	PSO1	PSO2	PSO3
CO1	1	2	3	1	3	-	-	-	3	3	-	-	2	3	1
CO2	1	2	3	3	3	-	-	-	3	3	-	-	2	3	1
CO3	1	2	3	3	3	-	-	-	3	3	-	-	2	3	1
CO4	1	2	3	3	3	-	-	-	3	3	-	-	2	3	1
CO5	1	2	3	3	3	-	-	-	3	3	-	-	2	3	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course: CONCRETE TECHNOLOGY LABORATORY
Category: Professional Core
Couse Code: 23A142L
Branch/es: Civil Engineering
Semester: IV

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:

To 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
1. Outline importance of testing cement and its properties CO2
2. Assess different properties of Aggregates
3. Assess fresh concrete properties and their relevance to hardened concrete

Detailed Syllabus:

1. Tests on Cement
- Normal Consistency and Fineness of cement.
- Initial setting time and Final setting time of cement
- Specific gravity and soundness of cement.
- Compressive strength of cement.

2. Tests on Fine Aggregates
- Grading and fineness modulus of Fine aggregate by sieve analysis.
- Specific gravity of fine aggregate
- Water absorption and Bulking of sand.

3. Tests on Coarse Aggregates
- Grading of Coarse aggregate by sieve analysis
- Specific gravity of coarse aggregate
- Water absorption of Coarse aggregates

4. Tests on fresh Concrete
- Workability of concrete by compaction factor method
- Workability of concrete by slump test
- Workability of concrete by Vee-bee test.

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

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of	Conduct investigations	Modern tool usage	The engineer and society	Environment and	Ethics	Individual and team work	Communication	Project management	Life-long learning	PSO1	PSO2	PSO3
CO1	1	2	3	3	-	2	-	-	3	-	-	2	2	3	3
CO2	1	2	3	3	-	2	-	-	3	-	-	2	2	2	3
CO3	1	2	3	3	-	2	-	-	3	-	-	2	2	2	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course: ENGINEERING GEOLOGY LABORATORY

Category: Professional Core
Couse Code: 23A141L
Branch/es: Civil Engineering
Semester: III

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:
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
1. Identify Megascopic minerals & their properties.
2. Identify Megascopic rocks & their properties.
3. Identify the site parameters such as contour, slope & aspect for topography.

4. Know the occurrence of materials using the strike& dip problems.

LIST OF EXPERIMENTS

1. Physical properties of minerals: Mega-scopic identification of
   a) Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
   b) Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…
2. Megascopic description and identification of rocks.
   a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
   b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
   c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite &Biotiteschist, Marble, Khondalite, etc.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
4. Simple Structural Geology problems.
5. Bore hole data.
6. Strength of the rock using laboratory tests.
7. Field work – To identify Minerals, Rocks, Geomorphology& Structural Geology.

LAB EXAMINATION PATTERN:

1. Description and identification of FOUR minerals
2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
3. ONE Question on Interpretation of a Geological map along with a geological section.

4. TWO Questions on Simple strike and Dip problems.
5. Bore hole problems.
6. Project report on geology.

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

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of	Conduct investigations	Modern tool usage	The engineer and society	Environment and	Ethics	Individual and team work	Communication	Project management	Life-long learning	PSO1	PSO2	PSO3
CO1	1	2	3	1	3	-	-	-	3	3	-	-	2	3	1
CO2	1	2	3	3	3	-	-	-	3	3	-	-	2	3	1
CO3	1	2	3	3	3	-	-	-	3	3	-	-	2	3	1
CO4	1	2	3	3	3	-	-	-	3	3	-	-	2	3	1
CO5	1	2	3	3	3	-	-	-	3	3	-	-	2	3	1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

(An Autonomous Institution)

Title of the Course: Skills in Civil Engineering software.
                              (STAADPRO/ETABS/CAD/REVIT/SAP)
Category: Skill Enhancement Course
Couse Code: 23A145L
Branch/es: Civil Engineering
Semester: IV

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives:

1. To learn the applications and basics of ETABS.
2. Enable to design and analysis RCC and steel structures.
3. Analyse RCand steel structures under earth quake loads.

Course Outcomes:

At the end of the course, the student will be able to
1. Outline the importance of ETABS in Analyzing the structures L5
2. Learn the tools useful for modeling, analyzing, designing a structures L5
3. Analyse & Design a Building for different loading conditions coming on to the structures L5
4. Analyse & Design of Multi storied Building L5

LIST OF EXPERIMENTS

1. Introduction to ETABS and various commands of ETABS
2. 2D model, analysis and design of Beam.
3. 2D model, analysis and design for different types of Trusses.
4. 2D model, analysis and design for Frames.
5. 3D model, analysis and design for Frames.
6. 3D model and analysis& Design for RC Buildings.
7. 3D model and analysis& Design for Steel.
8. Earthquake load application to RCC structures along with the design.
9. Earthquake load application to steel structures along with the design.
10. Design & analysis of High-rise storied Building along with wind loads.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and	Life-long learning	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	3	3	-	2	3	-	-	2	2	2
CO2	3	2	-	-	-	3	3	-	2	2	-	-	2	2	2
CO3	3	3	-	-	-	3	3	-	2	2	-	-	1	1	2
CO4	3	3	-	-	-	3	3	-	2	2	-	-	2	2	2
CO5	3	3	-	-	-	3	3	-	2	2	-	-	2	2	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course: DESIGN THINKING & INNOVATION
Category: Engineering Science
Couse Code: 23AHS48T
Branch/es: Civil Engineering
Semester: IV

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

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

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

Unit 1   Introduction to Design Thinking   12
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 2   Design Thinking Process   8
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 3   Innovation   8
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 4   Product Design   10
Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

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

Unit 5   Design Thinking in Business Processes   10

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.

Prescribed Textbooks:
1. Tim Brown,Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

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

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	PSO3
CO1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	-	2	2	-	1	1	-	-	-	-	1	1	-	-	-
CO3	-	1	2	-	-	-	-	-	1	1	-	1	-	-	-
CO4	-	3	-	-	-	-	-	-	1	1	-	1	-	-	-
CO5	-	3	3	3	-	-	-	-	-	-	1	1	-	-	-

COMMUNITY SERVICE PROJECT

......Experiential learning through community engagement

Introduction

•Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.

•Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.

Community Service Project is meant to link the community with the college for mutual benefit. The community will benefit with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and emerge as a socially responsible institution

Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships.

The specific objectives are;

•To sensitize the students to the living conditions of the people who are around them,

•To help students to realize the stark realities of society.

•To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability

•To make students aware of their inner strength and help them to find new /out of box solutions to social problems.

•To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.

•To help students to initiate developmental activities in the community in coordination with public and government authorities.

•To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

•Every student should put in 6 weeks for the Community Service Project during the summer vacation.

•Each class/section should be assigned with a mentor.

•Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc

•A logbook must be maintained by each of the students, where the activities undertaken/involved to be recorded.

•The logbook has to be countersigned by the concerned mentor/faculty in charge.

•An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.

•The final evaluation to be reflected in the grade memo of the student.

•The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc.

• Minor project reports should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.

• Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training.

Procedure

•A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to enable them to commute from their residence and return back by evening or so.

•The Community Service Project is a twofold one –

> o First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
>
> o Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
>
> - Agriculture
> - Health
> - Marketing and Cooperation
> - Animal Husbandry
> - Horticulture
> - Fisheries
> - Sericulture
> - Revenue and Survey
> - Natural Disaster Management
> - Irrigation
> - Law & Order
> - Excise and Prohibition
> - Mines and Geology
> - Energy
> - Internet
> - Free Electricity
> - Drinking Water

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EXPECTED OUTCOMES
BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

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Learning Outcomes

• Positive impact on students' academic learning
• Improves students' ability to apply what they have learned in "the real world"
• Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development.
• Improved ability to understand complexity and ambiguity

Personal Outcomes

• Greater sense of personal efficacy, personal identity, spiritual growth, and moral development

• Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills.

Social Outcomes

• Reduced stereotypes and greater inter-cultural understanding
• Improved social responsibility and citizenship skills
• Greater involvement in community service after graduation

Career Development

• Connections with professionals and community members for learning and career opportunities

•Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity.
Relationship with the Institution
•Stronger relationships with faculty
•Greater satisfaction with college
•Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS
- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research.

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES
- Improved institutional commitment.
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY
- Satisfaction with student participation
- Valuable human resources needed to achieve community goals.
- New energy, enthusiasm and perspectives applied to community work.
- Enhanced community-university relations.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT
The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

For Engineering Students
1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy

21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling level- observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs

Programs for School Children
1. Reading Skill Program (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Program on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Program on Socially relevant themes.

Programs for Women Empowerment
1. Government Guidelines and Policy Guidelines
2. Women's Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

General Camps
1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programs on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

Programs for Youth Empowerment
1. Leadership

2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

Common Programs
1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programs in consonance with the Govt. Departments like –
   i. Agriculture
   ii. Health
   iii. Marketing and Cooperation
   iv. Animal Husbandry
   v. Horticulture
   vi. Fisheries
   vii. Sericulture
   viii. Revenue and Survey
   ix. Natural Disaster Management
   x. Irrigation
   xi. Law & Order
   xii. Excise and Prohibition
   xiii. Mines and Geology
   xiv. Energy

Role of Students:
•Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
•For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
•As and when required the College faculty themselves act as Resource Persons.
•Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
•And also, with the Governmental Departments. If the program is rolled out, the District Administration could be roped in for the successful deployment of the program.
•An in-house training and induction program could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

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Timeline for the Community Service Project Activity

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Duration: 8 weeks
1.**Preliminary Survey (One Week)**
• A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
• A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
• The Governmental agencies, like revenue administration, corporation and municipal authorities and village secreteriats could be aligned for the survey.

2.**Community Awareness Campaigns (One Week)**

• Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmesto be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3.Community Immersion Programme (Three Weeks)

Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.

4.Community Exit Report (One Week)

•During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.