ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)

(Approved by AICTE, Recognized by the GOVT. of T.S., Permanent Affiliated to JNTU, Hyderabad)
Accredited by "NAAC" with B+ Grade, Recognized by UGC under Section 2(f) and 12(B)

Department of Humanities and Sciences
(Environmental Science)

Board of studies – Second meeting on 29/08/2025

AGENDA

Item-1: Welcoming the distinguished members of the Board of studies for the BoS meeting by the Head of the Department.

Item- 2: Review / Approval of the academic regulation for the B.Tech Program.

Item-3: Review / Approval of the course structure of B.Tech Program.

Item-4: Review / Approval of the detailed syllabus of Environmental Science theory.

Item-5: Any other suggestions to the Department.

Item-6: Vote of thanks.

Dr. G. Kiran Kumar

Chairperson of BoS, HOD H & S

L V V Gopala Rao
PRINCIPAL
Annamacharya Institute of
Technology & Sciences (Autonomous)
Piglipur (V), Batasingaram (Post),
Abdullapurmet (M), R.R. Dist. Hyd-501512

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Department of Humanities and Sciences
(Environmental Science)

BoS Members

S.NO	NAME	DESIGNATION	POSITION
1	Dr.L.V.Venu Gopala Rao	Principal, AITS, Hyderabad	Special Invitee
2	Dr. G. Kiran Kumar	HOD, H & S	Chairperson
3	Dr. T. Sabithakala	Asst. Professor in Chemistry, JNTUH, UCESTH	University Nominee
4	Dr. K. N. Shashi Kumar	Professor, AITK, Kadapa	Subject Expert
5	Dr. I. Pugazhenthi	Assoc. Professor, AITS, Rajampet	Subject Expert
6	Dr. K. Sunder Kumar	Assoc. Professor, AITS, Hyderabad	Member
7	Y. Sobha Lakshmi Kumari	Asst. Professor, AITS, Hyderabad	Member
8	K. Umadevi	Asst. Professor, AITS, Hyderabad	Member
9	Y. Madhavi	Asst. Professor, AITS, Hyderabad	Member
10	K. Anitha	Asst. Professor, AITS, Hyderabad	Member

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Department of Humanities and Sciences
(Environmental Science)

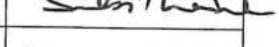
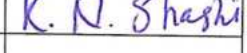
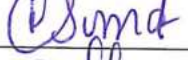
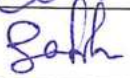
Board of Studies – Second meeting on 29/08/2025

Minutes of Meeting

Suggestions made by **Dr. T. Sabithakala**, University Nominee and **Dr. K. N. Shashi Kumar** and **Dr. I. Pugazhenthi** Subject Experts.

1. The committee members approved AR-25 Academic Regulation for the B.Tech Program.
2. Agreed with Course Structure of B.Tech Programs:
   a. Enivornmental Science Theory
3. After the detailed discussion on JNTUH'S R-25 Syllabi of Environmental Science, it is decided to follow the same syllabus.

The following members attended for BoS meeting:

S.NO	NAME	DESIGNATION	POSITION	SIGNATURE
1	Dr.L.V.Venu Gopala Rao	Principal, AITS, Hyderabad	Special Invitee	
2	Dr. G. Kiran Kumar	HOD, H & S	Chairperson	
3	Dr. T. Sabithakala	Asst. Professor in Chemistry, JNTUH, UCESTH	University Nominee	
4	Dr. K. N. Shashi Kumar	Professor, AITK, Kadapa	Subject Expert	
5	Dr. I. Pugazhenthi	Assoc. Professor, AITS, Rajampet	Subject Expert	
6	Dr. K. Sunder Kumar	Assoc. Professor, AITS, Hyderabad	Member	
7	Y. Sobha Lakshmi Kumari	Asst. Professor, AITS, Hyderabad	Member	
8	K. Umadevi	Asst. Professor, AITS, Hyderabad	Member	
9	Y. Madhavi	Asst. Professor, AITS, Hyderabad	Member	
10	K. Anitha	Asst. Professor, AITS, Hyderabad	Member	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, HYDERABAD

(AUTONOMOUS)

ENVIRONMENTAL SCIENCE

Course Structure & Syllabus (AR-25 Regulations)

Applicable from AY 2025-2026 Batch

B.Tech. II Year I Sem & II Sem (ECE & CSE)

Credits distribution:

S.No	Course Name	No. of Credits allotted
1	Environmental Science	01
	Total credits for the subject	01

Course Objectives:

1. Understand the components, structure and functions of ecosystems and their relevance to human society.
2. Comprehend classification, sustainable management, and challenges of natural resources including water, minerals, land, forests and energy.
3. Grasp the significance, value and conservation approaches for biodiversity, including threats and legislative frameworks.
4. Analyze types, sources and impacts of environmental pollution, and learn technological and policy measures for pollution prevention and control.
5. Develop awareness about global environmental challenges, international agreements, and the role of policy, law and Environmental Impact Assessment (EIA) in sustainable development.

Course Outcomes:

1. Understand the structure, function, and significance of ecosystems, including energy flow, biogeochemical cycles and biodiversity conservation through field experiences.
2. Analyze the classification, utilization, and sustainable management of natural resources, along with alternative energy options.
3. Evaluate biodiversity at genetic, species, and ecosystem levels, its values, threats, and conservation methods under national and international frameworks.
4. Identify types, sources, and impacts of environmental pollution, and apply suitable control technologies while assessing global environmental challenges and protocols.
5. Interpret environmental policies, legislation, and the EIA process to propose management plans addressing contemporary environmental and sustainability issues.

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation ,environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards.

Water pollution: Sources and types of pollution, drinking water quality standards.

Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil.

Noise Pollution: Sources and Health hazards, standards,

Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management.

Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation.

Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

Environmental Policy, Legislation &EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wildlife Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of base line data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental

Management Plan (EMP). Contemporary Environmental Issues Climate change; Sustainable development goals(SDGs); Global environmental challenges; Environmental policies and international agreements.

TEXTBOOKS:

1. Introduction to Environmental Science by Y.Anjaneyulu, BS. Publications.
2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
3. Environmental Studies by R.Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards as ustainable future byRichardT.Wright.2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by GilbertM. Masters and WendellP.Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B.Botkin & Edward A.Keller, WileyI NDIA edition.
4. Environmental Studies by Anubha Kaushik, 4 thEdition, Newage international publishers.
5. Textbook of Environmental Science and Technology- Dr .M. AnjiReddy2007, BS Publications.

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Department of Mathematics

Board of studies – Second meeting on 29/08/2025

AGENDA

Item-1: Welcoming the distinguished members of the Board of studies for the BOS meeting by the Head of the Department.

Item- 2: Review / Approval of the academic regulation for the B.Tech Program.

Item-3: Review / Approval of the course structure of B.Tech Program.

Item-4: Review / Approval of the detailed syllabus of Mathematics I-I, I-II, II-I and II-II Semesters.

Item-5: Any other suggestions to the Department.

Item-6: Vote of thanks.

L V V Gopala Rao
PRINCIPAL
Annamacharya Institute of
Technology & Sciences (Autonomous)
Piglipur (V), Batasingaram (Post),
Abdullapurmet (M), R.R. Dist. Hyd-501512

Dr.G.Kiran Kumar

Chairperson of BOS, HOD H & S

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Department of Mathematics

BoS Members

S.No	Name	DESIGNATION	POSITION
1	Dr. L.V.Venu Gopala Rao	Principal, AITS, Hyderabad	Special Invitee
2	Dr.G. Kiran Kumar	HOD, H & S	Chairperson
3	Dr. Y. Rajasekhar Reddy	Asst. Professor in Mathematics, JNTUH UCEJ	University Nominee
4	Dr. K V Nageswara Reddy	Professor, AITK, Kadapa	Subject Expert
5	Dr. L. Hari Krishna	Assoc. Prof, AITS, Rajampet	Subject Expert
6	A. Kavitha	Asst. Professor, AITS, Hyderabad	Member
7	Dr. B. Sailaja	Asst. Professor, AITS, Hyderabad	Member
8	M. Yakanna	Asst. Professor, AITS, Hyderabad	Member
9	R.Upender	Asst. Professor, AITS, Hyderabad	Member
10	T.Kavitha	Asst. Professor, AITS, Hyderabad	Member
11	K. Bhavana Sathya Sonia	Asst. Professor, AITS, Hyderabad	Member

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Department of Mathematics

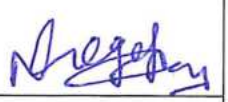
Board of Studies – Second meeting on 29/08/2025

Minutes of Meeting

Suggestions made by **Dr. Y. Rajasekhar Reddy**, University Nominee, **Dr. K V Nageswara Reddy** and **Dr. L. Hari Krishna** Subject Experts.

1. The committee members approved AR-25 Academic Regulation for the B.Tech Program.
2. Agreed with Course Structure of B.Tech Programs:
   a. Matrices And Calculus
   b. Ordinary Differential Equations And Vector Calculus
   c. Probability and Statistics
   d. Mathematical and Statistical Foundations
   e. Probability, Statistics and Complex Variables
   f. Numerical Methods And Complex Variables
   g. Computer Oriented Statistical Methods
   h. Computational Mathematics Lab
3. After the detailed discussion on JNTUH'S R-25 Syllabi of Matrices and Calculus and Ordinary Differential Equations and Vector Calculus, COMS, P&S, MSF, PSCV, NMCV and Computational Mathematics Lab, it is decided to follow the same syllabus.

The following members attended for BOS meeting:

S.NO	NAME	DESIGNATION	POSITION	SIGNATURE
1	Dr. L.V.Venu Gopala Rao	Principal, AITS, Hyderabad	Special Invitee	
2	Dr. G. Kiran Kumar	HOD, H & S	Chairperson	
3	Dr. Y. Rajasekhar Reddy	Asst. Professor in Mathematics, JNTUH UCEJ	University Nominee	
4	Dr. K V Nageswara Reddy	Professor, AITK, Kadapa	Subject Expert	
5	Dr. L. Hari Krishna	Assoc Prof, AITS, Rajampet	Subject Expert	

6	A. Kavitha	Asst. Professor, AITS, Hyderabad	Member	
7	Dr. B. Sailaja	Asst. Professor, AITS, Hyderabad	Member	
8	M. Yakanna	Asst. Professor, AITS, Hyderabad	Member	
9	R.Upender	Asst. Professor, AITS, Hyderabad	Member	
10	T.Kavitha	Asst. Professor, AITS, Hyderabad	Member	
11	K. Bhavana Sathya Sonia	Asst. Professor, AITS, Hyderabad	Member	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, HYDERABAD
(AUTONOMOUS)
MATRICES AND CALCULUS
B.Tech. I Year I Semester (Common to all branches)
Course Structure & Syllabus (AR-25Regulations)
Applicable from AY 2025-2026 Batch

Credits distribution:

S.No	Course Name	No. of Credits allotted
1	MATRICES AND CALCULUS	04
	Total credits for the subject	04

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn

1. Applying basic operations on matrices and their properties.
2. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
3. Concept of Eigen values and Eigen vectors and to reduce the quadratic form to canonical form
4. Geometrical approach to the mean value theorems and their application to the mathematical problems
5. Finding maxima and minima of functions of two and three variables.
6. Evaluation of multiple integrals and their applications.

Course outcomes: After learning the contents of this paper, the student must be able to

1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
2. Find the Eigen values and Eigenvectors
3. Reduce the quadratic form to canonical form using orthogonal transformations.
4. Solve the applications of the mean value theorems.
5. Find the extreme values of functions of two variables with/without constraints.
6. Evaluate the multiple integrals and apply the concept to find areas, volumes.

UNIT-I: Matrices **8L**

Rank of a matrix by Echelon form and Normal form—Inverse of Non-singular matrices by Gauss - Jordan method.

System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations. Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors **10L**

Linear Transformation and Orthogonal Transformation: Eigen values—Eigen vectors and their

properties–Diagonalization of a matrix–Cayley-Hamilton Theorem (without proof)–Finding inverse and power of a matrix by Cayley -Hamilton Theorem.

Quadratic forms and Nature of the Quadratic Forms–Reduction of Quadratic form to canonical form by Orthogonal Transformation.

UNIT-III: Single Variable Calculus **10L**

Limit and Continuous of functions and its properties. Mean value theorems: Rolle's theorem—Lagrange's Mean value theorem with their Geometrical Interpretation and applications—Cauchy's mean value Theorem —Taylor's Series (All the theorems without proof).

Curve Tracing: Curve tracing in Cartesian coordinates.

UNIT-IV: Multivariable Calculus (Partial Differentiation and applications) **10L**

Definitions of Limit and continuity–Partial Differentiation: Euler's Theorem –Total derivative – Jacobian —Functional dependence & independence.

Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration) **10L**

Evaluation of Double Integrals (Cartesian and polar coordinates) – change of order of integration (only Cartesian form)—Change of variables for double integrals (Cartesian to polar).Evaluation of Triple Integrals—Change of variables for triple integrals (Cartesian to Spherical and Cylindrical polar coordinates).

Applications: Areas by double integrals and volumes by triple integrals.

TEXT BOOKS:

1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 36thEdition, 2010.
2. R.K. Jain and S.R.K. Iyengar Advanced Engineering Mathematics, Narosa Publications, 5th Editon, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. N.P.Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, HYDERABAD
(AUTONOMOUS)
ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

B.Tech. I Year II Semester (Common to all branches)
Course Structure & Syllabus (AR-25Regulations)
Applicable from AY 2025-2026 Batch

Credits distribution:

S.No	Course Name	No. of Credits allotted
1	ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	03
	Total credits for the subject	03

Pre-requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn

1. Methods of solving the differential equations of first and higher order.
2. Concept, properties of Laplace transforms.
3. Solving ordinary differential equations using Laplace transforms techniques.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course outcomes: After learning the contents of this paper, the student must be able to

1. Identify whether the given differential equation of first order is exact or not
2. Solve higher differential equation and apply the concept of differential equation to real world problems.
3. Use the Laplace Transforms techniques for solving Ordinary Differential Equations.
4. Evaluate the Line, Surface and Volume integrals and converting them from one to another

UNIT-I: First Order Ordinary Differential Equations **8 L**

Exact differential equations – Equations reducible to exact differential equations – linear and Bernoulli's equations – Orthogonal Trajectories (only in Cartesian Coordinates).

Applications: Newton's law of cooling— Law of natural growth and decay.

UNIT II: Ordinary Differential Equations of Higher Order **10 L**

Higher order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sinax, cosax, polynomials in x, $e^{ax}V(x)$ and $xV(x)$.

Method of variation of parameters.

UNIT-III: Laplace Transforms **10L**

Laplace Transforms: Laplace Transform of standard functions—First shifting theorem —Laplace transforms of functions multiplied by 't' and divided by 't'—Laplace transforms of derivatives and integrals of function—Evaluation of integrals by Laplace transforms—Laplace transform of periodic functions—Inverse Laplace transform by different methods, convolution theorem (without proof).

Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation **10L**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives.

Vector Identities – Scalar potential functions – Solenoid and Irrotational vectors.

UNIT-V: Vector Integration **10L**

Line, Surface and Volume Integrals.

Theorems of Green, Gauss and Stokes (without proofs) and their applications

TEXT BOOKS:

1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 36thEdition, 2010.
2. R.K. Jain and S.R.K. Iyengar Advanced Engineering Mathematics, Narosa Publications, 5thEdition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9thEdition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
3. N.P.Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, HYDERABAD
(AUTONOMOUS)
MATHEMATICAL AND STATISTICAL FOUNDATIONS
B. Tech. II YEAR I SEM CSE (AIML), CSE (Data Science)
Course Structure & Syllabus (AR-25Regulations)

Applicable from AY 2025-2026 Batch

Credits Distribution

S. No.	Course Title	No. of Credits
1.	Mathematical and statistical Foundations	3
	Total Credits	3

Pre-requisites: Mathematical knowledge at pre university level

Course Objectives: To learn

1. The Number Theory basic concepts useful for cryptography etc.
2. The theory of Probability and probability distributions of single random variables.
3. The sampling theory and testing of hypothesis and making inferences.
4. The curve fitting, correlation and regression for the given data.

Course outcomes: After learning the contents of this paper, the student must be able to

1. Apply the number theory concepts to cryptography domain.
2. Apply the concepts of probability and distributions to some case studies.
3. Correlate the material of one unit to the material in other units.
4. Resolve the potential misconceptions and hazards in each topic of study.
5. Fit the curve, correlation and regression for the given data.

UNIT-I: Basics of Number Theory **10L**

Greatest Common Divisors and Prime Factorization: Greatest common divisors – The Euclidean algorithm –The fundamental theorem of arithmetic–Factorization of integers and the Fermat numbers.

Congruences: Introduction to congruences – Linear congruences.

UNIT-II: Random Variables and Probability Distributions **8L**

Concept of a Random Variable—Discrete Probability Distributions—Continuous Probability Distributions – Mean of a Random Variable – Variance of a Random Variable.

Discrete Probability Distributions: Binomial Distribution–Poisson distribution

UNIT-III: Continuous Distributions and Sampling **10L**

Uniform Distribution– Normal Distribution– Areas under the Normal Curve– Applications of the Normal Distribution—Normal Approximation to the Binomial Distributions.

Fundamental Sampling Distributions: Random Sampling – Some Important Statistics – Sampling Distributions – Sampling Distribution of Means – Central Limit Theorem.

UNIT-IV: Tests of Hypotheses (Large and Small Samples) **10L**

Statistical Hypotheses: General Concepts —Testing a Statistical Hypothesis. Single sample: Tests concerning a single mean. Two samples: Tests on two mean (Unknown for equal variance).

One sample: Test on a single proportion. Two samples: Tests on two proportions. Two-sample tests concerning variances: F-distribution

UNIT-V: Applied Statistics **10L**

Curve fitting by the method of least squares – Fitting of straight lines – Second degree parabolas and more general curves

Correlation and Regression – Rank correlation.

TEXTBOOKS:

1. Kenneth H. Rosen, Elementary Number Theory & its Applications, sixth edition, Addison Wesley, ISBN 978 0-321-50031-1.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9thEd. Pearson Publishers.
3. S C Gupta and V K Kapoor, Fundamentals of Mathematical Statistics, Khanna publications.

REFERENCEBOOKS:

1. T. T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press.
3. S C Gupta and V K Kapoor, Fundamentals of Mathematical Statistics, Khanna publications.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, HYDERABAD

(AUTONOMOUS)

PROBABILITY AND STATISTICS

B. Tech. II YEAR I SEM CIVIL ENGINEERING

Course Structure & Syllabus (AR-25Regulations)

Applicable from AY 2025-2026 Batch

Credits Distribution

S. No.	Course Title	No. of Credits
1.	Probability and Statistics	3
	Total Credits	3

Pre-requisites: Mathematical knowledge at pre university level

Course Objectives: To learn

- The theory of Random Variable, and probability distributions of single random variables.
- The sampling theory and testing of hypothesis and making statistical inferences.
- The curve fitting, correlation and regression for the given data.

Course out comes: After learning the contents of this paper, the student must be able to

- Apply the concepts of Random variable and distributions to some case studies.
- Correlate the concepts of one unit to the concepts in other units.
- Understoods Sampling theory and apply hypothesis testing in real-world scenarios
- Fit the curve, correlation and regression for the given data.

UNIT-I: Random Variables and Probability Distributions **8L**

Concept of a Random Variable—Discrete Probability Distributions—Continuous Probability Distributions – Mean of a Random Variable – Variance of a Random Variable

Discrete Probability Distributions: Binomial Distribution–Poisson distribution

UNIT-II: Continuous Distributions and Sampling **10L**

Uniform Distribution– Normal Distribution– Areas under the Normal Curve– Applications of the Normal Distribution—Normal Approximation to the Binomial Distributions.

Fundamental Sampling Distributions: Random Sampling – Some Important Statistics – Sampling Distributions – Sampling Distribution of Means – Central Limit

Theorem.

UNIT-III: Estimation **10L**

Introduction – Statistical Inference – Classical Methods of Estimation – Single Sample: Estimating the mean – Standard error of a point Estimate. Two samples: Estimating the difference between two means

Single sample: Estimating a proportion – Two samples: Estimating the difference between two proportions– Two samples: Estimating the ratio of two variances.

UNIT-IV: Tests of Hypotheses (Large and Small Samples) **10L**

Statistical Hypotheses: General Concepts —Testing a Statistical Hypothesis. Single sample: Tests concerning a single mean. Two samples: Tests on two mean (Unknown for equal variance).

One sample: Test on a single proportion. Two samples: Tests on two proportions. Two-sample tests concerning variances: F-distribution

UNIT-V: Applied Statistics **10L**

Curve fitting by the method of least squares – Fitting of straight lines – Second degree parabolas and more general curves.

Correlation and Regression – Rank correlation.

TEXT BOOKS:

1. Ronald E .Walpole, Raymond H . Myers, SharonL . Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9thEd. Pearson Publishers.
2. SC Gupta and VK Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

REFERENCE BOOKS

1. T.T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, Ltd, 2004.
2. Sheldon M Ross, Probability and Statistics for Engineers and Scientists, academic press

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, HYDERABAD

(AUTONOMOUS)

PROBABILITY, STATISTICS AND COMPLEX VARIABLES

B. Tech. II YEAR I SEM

MECHANICAL ENGINEERING

Course Structure & Syllabus (AR-25Regulations)

Applicable from AY 2025-2026 Batch

Credits Distribution

S. No.	Course Title	No. of Credits
1.	Probability, Statistics and Complex Variables	3
	Total Credits	3

Pre-requisites: Mathematical knowledge at pre university level

Course Objectives: To learn

1. The ideas of random variables and various discrete and continuous probability distributions and their properties.
2. The statistical methods of studying data samples.
3. Differentiation and integration of complex valued functions.
4. Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
5. Expansion of complex functions using Taylor's and Laurent's series.

Course out comes: After learning the contents of this paper, the student must be able to

1. ApplytheconceptsofRandomvariableanddistributionstosomecasestudies.
2. Correlate the concepts of one unit to the concepts in other units.
3. Understood sampling theory and apply hypothesis testing in real-world scenarios
4. Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
5. Taylor's and Laurent's series expansions in complex function.

UNIT-I: Random Variables and Probability Distributions **8L**

Concept of a Random Variable – Discrete Probability Distributions – Continuous Probability Distributions – Mean of a Random Variable – Variance of a Random Variable.

Discrete Probability Distributions: Binomial Distribution–Poisson distribution

UNIT-II: Continuous Distributions and sampling **10L**

Uniform Distribution–Normal Distribution–Areas under the Normal Curve–Applications of the Normal Distribution – Normal Approximation to the Binomial Distributions.

Fundamental Sampling Distributions: Random Sampling – Some Important Statistics – Sampling Distributions – Sampling Distribution of Means – Central Limit Theorem.

UNIT-III: Tests of Hypotheses (Large and Small Samples) **10L**

Statistical Hypotheses: General Concepts – Testing a Statistical Hypothesis. Single sample: Tests concerning single mean. Two samples: Tests on two mean (Unknown for equal variance).

One sample: Test on a single proportion. Two samples: Tests on two proportions. Two-sample tests concerning variances: F-distribution

UNIT-IV: Complex Differentiation **10L**

Differentiation of Complex functions – Analyticity – Cauchy-Riemann equations (without proof) Harmonic Functions – Finding harmonic conjugate – Milne Thomson method

Elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT-V: Complex Integration **10L**

Line integral – Cauchy's theorem – Cauchy's Integral formula – Zeros of analytic functions – Singularities

Taylor's series – Laurent's series. Residues – Cauchy Residue theorem (All theorems without Proof).

TEXTBOOKS

1. Ronald E. Walpole, Raymond H. Myers , Sharon L. Myers, Keying Ye , Probability & Statistics for Engineers & Scientists, 9thEd. Pearson Publishers.
2. SC Gupta and VK Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

REFERENCE BOOKS

1. T.T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley& Sons, Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, HYDERABAD

(AUTONOMOUS)

COMPUTER ORIENTED STATISTICAL METHODS

B. Tech. II YEAR II SEM COMPUTER SCIENCE ENGINEERING

Course Structure & Syllabus (AR-25Regulations)

Applicable from AY 2025-2026 Batch

Credits Distribution

S. No.	Course Title	No. of Credits
1.	Computer Oriented Statistical Methods	3
	Total Credits	3

Pre-requisites: Mathematical knowledge at pre university level

Course Objectives: To learn

1. The theory of Random variable Probability distributions of single random variables
2. The sampling theory, testing of hypothesis and making statistical inferences
3. Stochastic process and Markov chains.

Course out comes: After learning the contents of this paper, the student must be able to

1. Apply the concepts of Random variable and distributions to case studies.
2. Formulate and solve problems involving random variables and apply statistical methods for analyzing experimental data.
3. Apply concept of estimation and testing of hypothesis to case studies.
4. Correlate the concepts of one unit to the concepts in other units.

UNIT-I: Random Variables and Probability Distributions **8L**

Concept of a Random Variable—Discrete Probability Distributions—Continuous Probability Distributions – Mean of a Random Variable – Variance of a Random Variable

Discrete Probability Distributions: Binomial Distribution–Poisson distribution

UNIT-II: Continuous Distributions and sampling **10L**

Uniform Distribution – Normal Distribution – Areas under the Normal Curve – Applications of the Normal Distribution — Normal Approximation to the Binomial Distributions.

Fundamental Sampling Distributions: Random Sampling – Some Important Statistics – Sampling Distributions – Sampling Distribution of Means – Central Limit Theorem.

UNIT-III: Estimation **10L**

Introduction – Statistical Inference – Classical Methods of Estimation – Single Sample: Estimating the mean – Standard error of a point estimate .Two samples: Estimating the difference between two means

Single sample: Estimating a proportion —Two samples: Estimating the difference between two proportions– Two samples: Estimating the ratio of two variances.

UNIT-IV: Tests of Hypotheses (Large and Small Samples) **10L**

Statistical Hypotheses: General Concepts —Testing a Statistical Hypothesis. Single sample: Tests concerning a single mean. Two samples: Tests on two mean (Unknown for equal variance).

One sample: Test on a single proportion. Two samples: Tests on two proportions. Two-sample tests concerning variances: F-distribution

UNIT-V: Stochastic Processes and Markov Chains **10L**

Introduction to Stochastic processes – Markov process. Transition Probability, Transition Probability Matrix.

First order and Higher order Markov process, n-step transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXTBOOKS:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
2. SC Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. S.D. Sharma, Operations Research, Kedar nath and Ramnath Publishers, Meerut, Delhi.

REFERENCEBOOKS

1. T.T.Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press

Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, HYDERABAD

(AUTONOMOUS)

NUMERICAL METHODS AND COMPLEX VARIABLES

B. Tech. II YEAR II SEM

ELECTRONICS AND COMMUNICATION ENGINEERING & ELECTRICAL AND ELECTRONICS ENGINEERING

Course Structure & Syllabus (AR-25Regulations)

Applicable from AY 2025-2026 Batch

Credits Distribution

S. No.	Course Title	No. of Credits
1.	Numerical Methods and Complex Variables	3
	Total Credits	3

. **Pre-requisites:** Mathematical knowledge at pre university level

Course Objectives: To learn

1. Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms
2. Various numerical methods to find roots of polynomial and transcendental equations.
3. Concept of finite differences and to estimate the value for the given data using interpolation.
4. Evaluation of integrals using numerical techniques
5. Solving ordinary differential equations of first order using numerical techniques.
6. Differentiation and integration of complex valued functions.
7. Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
8. Expansion of complex functions using Taylor's and Laurent's series.

Course outcomes: After learning the contents of this paper, the student must be able to

1. Express any periodic function in terms of sine and cosine.
2. Find the root of a given polynomial and transcendental equations.
3. Estimate the value for the given data using interpolation
4. Find the numerical solutions for a given first order ODE's
5. Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
6. Taylor's and Laurent's series expansions in complex function.

UNIT-I: Fourier Series & Fourier Transforms **8L**

Fourier series—Dirichlet's Conditions—Half-range Fourier series

Fourier Transforms: Fourier Integral Theorem (Only statements), Fourier Sine and Cosine transforms (Elementary illustrations)

UNIT-II: Numerical Methods-I **10L**

Solution of polynomial and transcendental equations: Bisection method – Iteration Method – Newton- Raphson method and Regula-Falsi method.

Finite differences: forward differences—backward differences – central differences – symbolic relations–Interpolation using Newton's forward and backward difference formulae – Lagrange's method of interpolation.

UNIT-III: Numerical Methods-II **10L**

Numerical integration: Trapezoidal rule-Simpson's1/3rd and 3/8th rules.

Ordinary differential equations: Taylor's series – Euler's method – Runge-Kutta method of fourth order for first order ODE.

UNIT-IV: Complex Differentiation **10L**

Differentiation of Complex functions–Analyticity–Cauchy-Riemann equations (without proof)

Harmonic Functions – Finding harmonic conjugate – Milne-Thomson method – Elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT-V: Complex Integration **10L**

Line integral—Cauchy's theorem—Cauchy's Integral formula—Zeros of analytic functions— Singularities

Taylor's series – Laurent's series. Residues – Cauchy Residue theorem (All theorems without Proof).

TEXTBOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. S. S. Sastry, Introductory methods of numerical analysis, PH I, 4th Edition ,2005.

REFERENCE BOOKS

1. Murray R.Spiegel,Ph.D.,Seymour Lipschutz ,Ph.D., John J. Schiller , Ph.D.,Dennis Spellman, Ph.D., Complex Variables (Schaum's outline).
2. M.K. Jain, S.R.K.Iyengar , R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition,John Wiley & Sons, 2006.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc-GrawHill, 2004.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, HYDERABAD

(AUTONOMOUS)

COMPUTATIONAL MATHEMATICS LAB

(Using Python/ MATLAB software)

~~B.Tech. II Year I & II Semesters (Common to all branches)~~

Course Structure & Syllabus (AR-25Regulations)

Applicable from AY 2025-2026 Batch

Credits distribution:

S.No	Course Name	No. of Credits allotted
1	COMPUTATIONAL MATHEMATICS LAB (Using Python/ MATLAB software)	01
	Total credits for the subject	01

Pre-requisites: Matrices, Iterative methods and ordinary differential equations

Course Objectives: To learn

1. Solve problems of Eigen values and Eigen Vectors using Python/ MATLAB.
2. Solution of Algebraic and Transcendental Equations using Python/ MATLAB
3. Solve problems of Linear system of equations
4. Solve problems of First-Order ODEs Higher order linear differential equations with constant coefficients

Course outcomes: After learning the contents of this paper, the student must be able to

1. Develop the code to find the Eigen values and Eigen Vectors using Python/ MATLAB.
2. Develop the code find solution of Algebraic and Transcendental Equations and Linear system of equations using Python/ MATLAB
3. WritethecodetosolveproblemsofFirst-OrderODEsHigherorderlineardifferentialequations with constant coefficients

***Visualize all solutions Graphically through programmes**

UNIT-I: Eigen values and Eigen vectors: **6P**

Programs:

- Finding real and complex Eigen values.
- Finding Eigen vectors.

UNIT-II: Solution of Algebraic and Transcendental Equations **6P**

Bisection method, Newton Raphson Method

Programs:

- Root of a given equation using Bisection method.
- Root of a given equation Newton Raphson Method.

UNIT-III: Linear system of equations: **6P**

Jacobi's iteration method and Gauss-Seidal iteration method

Programs:

- Solution of given system of linear equations using Jacobi's method
- Solution of given system of linear equations using Gauss-Seidal method

UNIT-IV: First- Order ODEs **8P**

Exact and non-exact equations, Applications: exponential growth/ decay, Newton's law of cooling.

Programs:

- Solving exact and non-exact equations
- Solving exponential growth/ decay and Newton's law of cooling problems

UNIT-V: Higher order linear differential equations with constant coefficients **6P**

Programs:

- Solving homogeneous ODEs
- Solving non- homogeneous ODEs

TEXTBOOKS:

1. MATLAB and its Applications in Engineering, Rajkumar Basal, Ashok Kumar Geo, Manoj Kumar Sharma, Pearson publication.
2. Kenneth A. Lambert, The fundamentals of Python: First Programs, 2011, Cengage Learnings.
3. Think Python First Edition, by Allen B. Downey, Orielly publishing.
4. Introduction to Python Programming, William Mitchell, Povel Solin, Martin Novak etal., NC Lab Public Computing, 2012.
5. Introduction to Python Programming, ©JacobFredslund, 2007.

REFERENCEBOOKS:

1. An Introduction to Python, JohnC. Lusth, The University of Alabama, 2011.
2. Introduction to Python, ©DaveKuhlman, 2008.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
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Department of Physics

Board of studies – Second meeting on 29/08/2025

AGENDA

Item-1: Welcoming the distinguished members of the Board of studies for the BoS meeting by the Head of the Department.

Item- 2: Review / Approval of the Academic Regulation for the B.Tech Program.

Item-3: Review / Approval of the Course Structure of B.Tech Program.

Item-4: Review / Approval of the detailed syllabus of Advanced Engineering Physics theory.

Item-5: Review / Approval of the detailed syllabus of Advanced Engineering Physics lab.

Item-6: Any other suggestions to the Department.

Item-7: Vote of thanks.

Dr. G. Kiran Kumar

Chairperson of BoS, HOD H & S

L V V Gopala Rao

PRINCIPAL
Annamacharya Institute of
Technology & Sciences (Autonomous)
Piglipur (V), Batasingaram (Post),
Abdullapurmet (M), R.R. Dist. Hyd-501512

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
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Department of Physics

BoS Members

S.NO	NAME	DESIGNATION	POSITION
1	Dr. LV. Venu Gopala Rao	Principal, AITS, Hyderabad	Special Invitee
2	Dr. G. Kiran Kumar	HOD, H & S	Chairperson
3	Dr. K. Venkateswara Rao	Professor of Nano Technology, JNTUH UCESTH	University Nominee
4	Dr. T Ravindra Reddy	Professor, AITK, Kadapa.	Subject Expert
5	Dr. L. Obulapathi	Assoc Prof, AITS, Rajampet	Subject Expert
6	M. Amaranath	Asst. Professor, AITS	Member
7	T. Alekya	Asst. Professor, AITS	Member
8	M. Mallesh	Asst. Professor, AITS	Member
9	A. Bhadraiah	Asst. Professor, AITS	Member

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Department of Physics

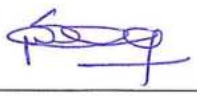
Board of Studies – Second meeting on 29/08/2025

Minutes of Meeting

Suggestions made by **Dr. K. Venkateswara Rao**, University Nominee and **Dr. T Ravindra Reddy** and **Dr. L. Obulapathi** Subject Experts.

1. The committee members approved AR-25 Academic Regulation for the B.Tech Program.
2. Agreed with Course Structure of B.Tech Programs:
   a. Advanced Engineering Physics Theory
   b. Advanced Engineering Physics Lab
3. After the detailed discussion on JNTUH'S R-25 Syllabi of Advanced Engineering Physics Theory and Advanced Engineering Physics Lab, it is decided to follow the same syllabus.

The following members attended for BOS meeting:

S.NO	NAME	DESIGNATION	POSITION	SIGNATURE
1	Dr. LV. Venu Gopala Rao	Principal, AITS, Hyderabad	Special Invitee	
2	Dr. G. Kiran Kumar	HOD, H & S	Chairperson	
3	Dr. K. Venkateswara Rao	Professor of Nano Technology, JNTUH UCESTH	University Nominee	
4	Dr. T Ravindra Reddy	Professor, AITK, Kadapa	Subject Expert	
5	Dr. L. Obulapathi	Assoc Prof, AITS, Rajampet	Subject Expert	
6	M .Amaranath	Asst. Professor, AITS	Member	
7	T. Alekya	Asst. Professor, AITS	Member	
8	M. Mallesh	Asst. Professor, AITS	Member	
9	A. Bhadraiah	Asst. Professor, AITS	Member	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES
(AUTONOMOUS), HYDERABAD
B. Tech. I YEAR COMMON TO ALL BRANCHES
~~Course Structure & Syllabus (AR-25Regulations)~~
Applicable from AY 2025-2026 Batch

ADVANCED ENGINEERING PHYSICS

S. No.	Course Title	No. of Credits
1.	Advanced Engineering Physics	3
	Total Credits	3

B.Tech. I Year I & II Sem.

Pre-requisites: 10+2 Physics

Course Objectives:

1. To study crystal structures, defects, and material characterization techniques like XRD and SEM.
2. To understand fundamental concepts of quantum mechanics and their applications in solids and nano materials.
3. To introduce quantum computing principles, quantum gates and basic quantum algorithms.
4. To learn the properties and applications of magnetic and dielectric materials.
5. To explore the working and applications of lasers and fiber optics in modern technology.

Course Outcomes:

1. **CO1**: Analyze crystal structures, identify defects, and apply XRD and SEM techniques for material characterization.
2. **CO2**: Apply quantum mechanical principles to explain particle behavior and energy band formation in solids.
3. **CO3**: Understand quantum computing concepts, use quantum gates and explain basic quantum algorithms.
4. **CO4**: Classify magnetic and dielectric materials and explain their properties, synthesis and applications.
5. **CO5**: Explain the principles of lasers and fiber optics and their applications in communication and sensing.

UNIT-I: Crystallography & Materials Characterization

Introduction: Unit cell, space lattice, basis, lattice parameters; crystal structures, Bravais lattices, packing factor: SC, BCC, FCC; Miller indices, inter-planar distance; defects in crystals (Qualitative): point defects, line defects, surface defects and volume defects.

Concept of nano materials: surface to volume ratio, X-ray diffraction: Bragg's law, powder method, calculation of average crystallite size using Debye Scherer's formula, scanning electron microscopy (SEM): block diagram, working principle.

UNIT-II: Quantum Mechanics

Introduction: De-Broglie hypothesis, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics, Eigen values and Eigen functions, expectation value; Schrödinger's time independent wave equation, particle in a 1D box, Bloch's theorem (qualitative).

Concept of Solids: Kronig-Penney model (qualitative): E-k diagram, effective mass of electron, formation of energy bands, origin of band gap, classification of solids, concept of discrete energy levels and quantum confinement in nano materials.

UNIT-III: Quantum Computing

Introduction: Linear algebra for quantum computation. Dirac's Bra and Ket notation and their properties, Hilbert space, Bloch's sphere.

Concept of quantum computer: classical bits, Qubits, multiple Qubit system, quantum computing system for information processing, evolution of quantum systems, quantum measurements, entanglement, quantum gates, challenges and advantages of quantum computing over classical computation, Quantum algorithms: Deutsch-Jozsa, Shor, Grover.

UNIT-IV: Magnetic and Dielectric Materials

Magnetic Materials: Introduction to magnetic materials, origin of magnetic moment-classification of magnetic materials, hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, synthesis of ferromagnetic materials using sol-gel method, applications magnetic hyperthermia for cancer treatment, magnets for EV, Giant Magneto Resistance (GMR) device.

Dielectric Materials: Introduction to dielectric materials, types of polarization (qualitative): electronic, ionic & orientation; ferroelectric, piezoelectric, pyro electric materials and their

applications: Ferroelectric Random-Access Memory (Fe-RAM), load cell and fire sensor.

UNIT-V: Laser and Fiber Optics

Concept of Lasers: Introduction to laser, characteristics of laser, Einstein coefficients and their relations, meta stable state, population inversion, pumping, lasing action, Ruby laser, He-Ne laser, CO2 laser, semi conductor diode laser, applications: Bar code scanner, LIDAR for autonomous vehicle.

Concept of Fiber Optics: Introduction to fiber optics, total internal reflection, construction of optical fiber, acceptance angle, numerical aperture, classification of optical fibers, losses in optical fiber, applications: optical fiber for communication system, sensor for structural health monitoring.

TEXTBOOKS:

1. Walter Borchardt-Ott, *Crystallography: An Introduction*, Springer.
2. Charles Kittel, *Introduction to Solid State Physics*, John Wiley &Sons, Inc.
3. ThomasG.Wong,*IntroductiontoClassicalandQuantumComputing*,RootedGrove

REFERENCEBOOKS:

1. Jozef Gruska, *Quantum Computing*, Mc Graw Hill
2. Michael.A. Nielsen & IsaacL. Chuang, *Quantum Computation and Quantum Information*, Cambridge University Press.
3. John M. Senior, *Optical Fiber Communications Principles and Practice*, Pearson Education Limited.

ADVANCED ENGINEERING PHYSICS LAB

S. No.	Course Title	No. of Credits
1.	Advanced Engineering Physics lab	1
	Total Credits	1

B. Tech. I Year I & II Sem.

Course Objectives:

1. To provide practical exposure to advanced concepts in solid-state and modern physics.
2. To synthesize and study the physical properties of materials like semi conductors, ferromagnetic, and ferroelectric substances.
3. To perform semi conductor characterization using Hall effect and band gap experiments.
4. To explore the working principles of lasers and optical fibers through hands-on experiments.
5. To develop skills in data analysis, interpretation, and scientific reporting.

Course Out comes:

1. **CO1:** Synthesize and analyze nano materials such as magnetite (Fe3O4) using chemical methods.
2. **CO2:** Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.
3. **CO3:** Characterize semi conductors using Hall effect and energy gap measurement techniques.
4. **CO4:** Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.
5. **CO5:** Apply scientific methods for accurate data collection, analysis, and technical report writing.

List of Experiments:

1. Synthesis of magnetite (Fe3O4) powder using sol-gel method.
2. Determination of energy gap of a semiconductor.
3. Determination of Hall coefficient and carrier concentration of a given semiconductor.
4. Determination of magnetic moment of a bar magnet and horizontal earth magnetic field.
5. Study of B-H curve of a ferromagnetic material.
6. Study of P-E loop of a given ferroelectric crystal.
7. Determination of dielectric constant of a given material.
8. Determination of Curie's temperature of a given ferro electric material.
9. A) Determination of wave length of a laser using diffraction grating.
   B) Study of V-I&L-I characteristics of a given laser diode.
10. A) Determination of numerical aperture of a given optical fiber.
    B) Determination of bending losses of a given optical fiber.

Note: Any 8 experiments are to be performed.

ADVANCED ENGINEERING PHYSICS LAB

S. No.	Course Title	No. of Credits
1.	Advanced Engineering Physics lab	1
	Total Credits	1

B. Tech. I Year I & II Sem.

Course Objectives:

1. To provide practical exposure to advanced concepts in solid-state and modern physics.
2. To synthesize and study the physical properties of materials like semi conductors, ferromagnetic, and ferroelectric substances.
3. To perform semi conductor characterization using Hall effect and band gap experiments.
4. To explore the working principles of lasers and optical fibers through hands-on experiments.
5. To develop skills in data analysis, interpretation, and scientific reporting.

Course Out comes:

1. **CO1:** Know the determination of the Planck's constant using Photo electric effect.
2. **CO2:** Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.
3. **CO3:** Characterize semi conductors using Hall effect and energy gap measurement techniques.
4. **CO4:** Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.
5. **CO5:** Apply scientific methods for accurate data collection, analysis, and technical report writing.

List of Experiments:

1. Determination of energy gap of a semiconductor.
2. Determination of Hall coefficient and carrier concentration of a given semiconductor.
3. Determination of magnetic moment of a bar magnet and horizontal earth magnetic field.
4. Study of B-H curve of a ferromagnetic material.
5. Determination of work function and Planck's constant using photoelectric effect.
6. Study of V-I Characteristics of solar cell.
7. Determination of dielectric constant of a given material.
8. V-I and L-I characteristics of light emitting diode (LED).
9. A) Determination of wave length of a laser using diffraction grating.
   B) Study of V-I & L-I characteristics of a given laser diode.
10. A) Determination of numerical aperture of a given optical fiber.
    B) Determination of bending losses of a given optical fiber.

Note: Any 8 experiments are to be performed.

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Department of Chemistry

Board of studies – Second Meeting on 29/08/2025

AGENDA

Item-1: Welcoming the distinguished members of the Board of studies for the BOS meeting by the Head of the Department.

Item- 2: Review / Approval of the academic regulation for the B.Tech Program.

Item-3: Review / Approval of the course structure of B.Tech Program.

Item-4: Review / Approval of the detailed syllabus of Engineering Chemistry theory.

Item-5: Review / Approval of the detailed syllabus of Engineering Chemistry lab.

Item-6: Any other suggestions to the Department.

Item-7: Vote of thanks.

L V V Gopala Rao
PRINCIPAL
Annamacharya Institute of
Technology & Sciences (Autonomous)
Piglipur (V), Batasingaram (Post),
Abdullapurmet (M), R.R. Dist. Hyd-501512

Dr. G. Kiran Kumar

Chairperson of BOS, HOD H & S

Department of Chemistry

BoS Members

S.NO	NAME	DESIGNATION	POSITION
1	Dr.L.V.Venu Gopala Rao	Principal, AITS, Hyderabad	Special Invitee
2	Dr. G. Kiran Kumar	HOD, H & S	Chairperson
3	Dr. T. Sabithakala	Asst. Professor in Chemistry, JNTUH, UCESTH	University Nominee
4	Dr. K. N. Shashi Kumar	Professor, AITK, Kadapa	Subject Expert
5	Dr. I. Pugazhenthi	Assoc. Professor, AITS, Rajampet	Subject Expert
6	Dr. K. Sunder Kumar	Assoc. Professor, AITS, Hyderabad	Member
7	K. Umadevi	Asst. Professor, AITS, Hyderabad	Member
8	Y. Madhavi	Asst. Professor, AITS, Hyderabad	Member
9	K. Anitha	Asst. Professor, AITS, Hyderabad	Member

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Department of Chemistry

Board of Studies –Second Meeting on 29/08/2025

Minutes of Meeting

Suggestions made by **Dr. T. Sabithakala**, University Nominee and **Dr. K. N. Shashi Kumar** and **Dr. I. Pugazhenthi** Subject Experts.

1. The committee members approved AR-25 Academic Regulation for the B.Tech Program.
2. Agreed with Course Structure of B.Tech Programs:
   a. Engineering Chemistry Theory
   b. Engineering Chemistry Lab
3. After the detailed discussion on JNTUH'S AR-25 Syllabi of Engineering Chemistry, Applied Chemistry Theory and Engineering Chemistry Lab and Chemistry Lab for Engineers, it is decided to follow the same syllabus.

The following members attended for BoS meeting:

S.NO	NAME	DESIGNATION	POSITION	SIGNATURE
1	Dr.L.V.Venu Gopala Rao	Principal, AITS, Hyderabad	Special Invitee	LVV Gopala Rao
2	Dr. G. Kiran Kumar	HOD, H & S	Chairperson	
3	Dr. T. Sabithakala	Asst. Professor in Chemistry, JNTUH, UCESTH	University Nominee	Sabithakala
4	Dr. K. N. Shashi Kumar	Professor, AITK, Kadapa	Subject Expert	K.N. Shashi
5	Dr. I. Pugazhenthi	Assoc. Professor, AITS, Rajampet	Subject Expert	
6	Dr. K. Sunder Kumar	Assoc. Professor, AITS, Hyderabad	Member	
7	K. Umadevi	Asst. Professor, AITS, Hyderabad	Member	
8	Y. Madhavi	Asst. Professor, AITS, Hyderabad	Member	
9	K. Anitha	Asst. Professor, AITS, Hyderabad	Member	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, HYDERABAD
(AUTONOMOUS)
Course Structure & Syllabus (AR-25 Regulations)
Applicable from AY 2025-2026 Batch

ENGINEERING CHEMISTRY

B.Tech. I Year I Sem & II Sem (CSE, CSD, Al &Ml, ECE& EEE)

Credits distribution:

S.No	Course Name	No. of Credits allotted
1	Engineering Chemistry	03
	Total credits for the subject	03

Course Objectives:

1. To develop adaptability to new advances in Engineering Chemistry and acquire the essential skills to become a competent engineering professional.
2. To understand the industrial significance of water treatment, fundamental principles of battery chemistry, and the impact of corrosion along with its control methods for structural protection.
3. To impart foundational knowledge of various energy sources and their practical applications in engineering.
4. To equip students with an understanding of smart materials, biosensors and analytical techniques applicable in engineering, industrial, environmental, and biomedical fields.

Course Outcomes:

1. Students will be able to understand the fundamental properties of water and its applications in both domestic and industrial purposes.
2. Studentswillgainbasicknowledgeofelectrochemicalprocessesandtheirrelevanceto corrosion and its control methods.
3. Students will comprehend the significance and practical applications of batteries and various energy sources, enhancing their potential as future engineers and entrepreneurs.
4. Studentswilllearnthebasicconceptsandpropertiesofpolymersandotherengineering materials.
5. Students will be able to apply the principles of UV-Visible, IR spectroscopy and Raman spectroscopy in analyzing pollutants in dye industries and biomedical applications.

UNIT-I: Water and its treatment: [8]

Introduction-Hardness, types, degree of hardness and units. Estimation of hardness of water by complexometric method-Numerical problems. Potable water and its specifications (WHO) -Steps involved in the treatment of potable water-Disinfection of potable water by chlorination and break-point chlorination. Defluoridation-Nalgonda technique.

Boiler troubles: Scales, Sludges and Caustic embrittlement. Internal treatment of boiler feed water-Calgon conditioning, Phosphate conditioning, Colloidal conditioning. External treatment methods-Softening of water by ion-exchange processes. Desalination of brackish water—Reverse osmosis.

UNIT-II: Electrochemistry and Corrosion: [8]

Introduction-Electrode potential, standard electrode potential, Nernst equation (no derivation), electrochemical cell - Galvanic cell, cell representation, EMF of cell - Numerical problems. Types of electrodes, reference electrodes-Primary reference electrode-Standard Hydrogen Electrode (SHE), Secondary reference electrode–Calomel electrode. Construction, working and determination of pH of unknown solution using SHE and Calomel electrode.

Corrosion: Introduction- Definition, causes and effects of corrosion—Theories of corrosion, chemical and electrochemical theories of corrosion, Types of corrosion: galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion-Nature of the metal, Nature of the corroding environment. Corrosion control methods-Cathodic protection Methods-Sacrificial anode and impressed current methods.

UNIT–III: Energy sources: [8]

Batteries: Introduction—Classification of batteries-Primary, secondary and reserve batteries with examples. Construction, working and applications of Zn-air and Lithium ion battery. Fuel Cells—Differences between a battery and a fuelcell, Construction and applications of Direct Methanol Fuel Cell (DMFC).

Fuels: Introduction and characteristics of a good fuel, Calorific value—Units-HCV, LCV-Dulongs formula - Numerical problems.

Fossil fuels: Introduction, Classification, Petroleum-Refining of Crude oil, Cracking-Types of cracking-Moving bed catalytic cracking. LPG and CNG composition and uses.

Synthetic Fuels: Fischer Tropsch process, Introduction and applications of Hythane and Green Hydrogen.

UNIT-IV: Polymers: [8]

Definition-Classification of polymers: Based on origin and tacticity with examples—Types of polymerization - Addition (free radical addition mechanism) and condensation polymerization.

Plastics, Elastomers and Fibers: Definition and applications (PVC, Buna-S, Nylon-6,6). Differences between themo plastics and thermo setting plastics, Fiber reinforced plastics (FRP).

Conducting polymers: Definition and Classification with examples-Mechanism of conduction in trans- poly-acetylene and applications of conducting polymers.

Biodegradable polymers: Polylactic acid and its applications.

UNIT-V-Advanced Functional Materials: [8]

Smart materials: Introduction, Classification with examples-Shape Memory Alloys—Nitinol, Piezoelectric materials–quartz and their engineering applications.

Biosensor-Definition, Amperometric Glucose monitor sensor.

Interpretative spectroscopic applications of UV-Visible spectroscopy for Analysis of pollutants in dye industry, IR spectroscopy in night vision-security, Pollution Under Control-CO sensor (Passive Infrared detection), Raman spectroscopy (application)-Tumour detection in medical applications.

TEXTBOOKS:

1. Engineering Chemistry by P.C.Jain and M.Jain, Dhanpatrai Publishing Company, 2010.
2. Engineering Chemistry by Rama Devi, Dr.P. Aparna and Rath, Cengage learning, 2025.

REFERENCEBOOKS:

1. Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020).
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd.Delhi2011.
3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.
4. Engineering Analysis of Smart Material Systems by DonaldJ. Leo, Wiley,2007.
5. Challenges and Opportunities in Green Hydrogen by Editors: Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.
6. RamanSpectroscopyinHumanHealthandBiomedicine,https://www.worldscientific.com/doi/epdf/10.1142/13094

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, HYDERABAD

(AUTONOMOUS)

ENGINEERING CHEMISTRY LAB

Course Structure & Syllabus (AR-25 Regulations)

Applicable from AY 2025-2026 Batch

B.Tech. I Year I Sem & II Sem (CSE, CSD, Al &Ml, ECE& EEE)

Credits distribution:

S.No	Course Name	No. of Credits allotted
1	Engineering Chemistry Lab	1
	Total credits for the Lab	1

Course Description: The course includes experiments based on fundamental principles of chemistry essential for engineering students, aiming to develop practical skills and reinforce theoretical concepts.

Course Objectives

1. Students will understand and perform experiments based on core chemical principles relevant to engineering applications.
2. Students will earn to estimate the hardness of water to assess its suitability for drinking purposes.
3. Students will acquire the ability to perform acid base titrations using instrumental methods such as conductometry, potentiometry, and pH metry.
4. Students will gain hands-on experience in synthesizing polymers like Bakelite and Nylon–6,6 in the laboratory.
5. Students will earn to determine the unknown concentration of potassium permanganate (KMnO4) using a calibration curve.

Course Out comes:

1. Students will develop practical skills through hands-on chemistry experiments relevant to engineering.
2. Students will earn to determine important parameters such as water hardness and the corrosion rate of mild steel under various conditions.

3. Students will be able to apply techniques like conductometry, potentiometry, and pH metry to determine concentrations or equivalence points in acid-base reactions.
4. Students will gain experience in synthesizing polymers such as Bakelite and Nylon-6,6.
5. Students will understand the working principle of colorimetry and the relationship between absorbance and concentration (Beer-Lambert Law).

List of Experiments:

I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.

II. **Conductometry:**
   1. Estimation of the concentration of strong acid by Conductometry.
   2. Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.

III. **Potentiometry:**
   1. Estimation of concentration of Fe^{+2} ion by Potentiometry using KMnO4.
   2. Estimation of concentration of strong acid with strong base by Potentiometry using quinhydrone

IV. **pHMetry:** Determination of an acid concentration using pH

V. **Colorimetry:** Verification of Lambert-Beer's law using KMnO4

VI. **Preparations:**
   1. Preparation of Bakelite.
   2. Preparation Nylon–6,6.

VII. **Corrosion:** Determination of rate of corrosion of mildsteel in the presence and absence of inhibitor.

VIII. **Virtual lab experiments:**
   1. Construction of Fuelcell and it's working.
   2. Smart materials for Biomedical applications
   3. Batteries for electrical vehicles.
   4. Functioning of solar cell and its applications.

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5thedition
3. In organic Quantitative analysis by A.I.Vogel ,ELBS Publications.
4. College Practical Chemistry by V.K.Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, HYDERABAD
(AUTONOMOUS)
APPLIED CHEMISTRY
Course Structure & Syllabus (AR-25 Regulations)
Applicable from AY 2025-2026 Batch
B.Tech. I Year II Sem (CIVIL & MECH)

Credits distribution:

S.No	Course Name	No. of Credits allotted
1	Applied Chemistry	03
	Total credits for the subject	03

Course Objectives:

1. To develop adaptability to new advances in Engineering Chemistry and acquire the essential skills to become a competent engineering professional.
2. To understand the industrial significance of water treatment, fundamental principles of battery chemistry, and the impact of corrosion along with its control methods for structural protection.
3. To impart foundational knowledge of various energy sources and their practical applications in engineering.
4. To equip students with an understanding of smart materials, biosensors and analytical techniques applicable in engineering, industrial, environmental, and biomedical fields.

Course Outcomes:

1. Students will be able to understand the fundamental properties of water and its applications in both domestic and industrial purposes.
2. Studentswillgainbasicknowledgeofelectrochemicalprocessesandtheirrelevanceto corrosion and its control methods.
3. Students will comprehend the significance and practical applications of batteries and various energy sources, enhancing their potential as future engineers and entrepreneurs.
4. Studentswilllearnthebasicconceptsandpropertiesofpolymersandotherengineering materials.
5. Students will be able to apply the principles of UV-Visible, IR spectroscopy and Raman spectroscopy in analyzing pollutants in dye industries and biomedical applications.

UNIT-I: Water and its treatment: [8]

Introduction-Hardness, types, degree of hardness and units. Estimation of hardness of water by complexometric method-Numerical problems. Potable water and its specifications (WHO) -Steps involved in the treatment of potable water-Disinfection of potable water by chlorination and break-point chlorination. Defluoridation-Nalgonda technique.

Boiler troubles: Scales, Sludges and Caustic embrittlement. Internal treatment of boiler feed water-Calgon conditioning, Phosphate conditioning, Colloidal conditioning. External treatment methods-Softening of water by ion-exchange processes. Desalination of brackish water—Reverse osmosis.

UNIT-II: Electrochemistry and Corrosion: [8]

Introduction-Electrode potential, standard electrode potential, Nernst equation (no derivation), electrochemical cell - Galvanic cell, cell representation, EMF of cell - Numerical problems. Types of electrodes, reference electrodes-Primary reference electrode-Standard Hydrogen Electrode (SHE), Secondary reference electrode–Calomel electrode. Construction, working and determination of pH of unknown solution using SHE and Calomel electrode.

Corrosion: Introduction- Definition, causes and effects of corrosion—Theories of corrosion, chemical and electrochemical theories of corrosion, Types of corrosion: galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion-Nature of the metal, Nature of the corroding environment. Corrosion control methods-Cathodic protection Methods-Sacrificial anode and impressed current methods.

UNIT–III: Energy sources: [8]

Batteries: Introduction—Classification of batteries-Primary, secondary and reserve batteries with examples. Construction, working and applications of Zn-air and Lithium ion battery. Fuel Cells—Differences between a battery and a fuelcell, Construction and applications of Direct Methanol Fuel Cell (DMFC).

Fuels: Introduction and characteristics of a good fuel, Calorific value—Units-HCV, LCV-Dulongs formula - Numerical problems.

Fossil fuels: Introduction, Classification, Petroleum-Refining of Crude oil, Cracking-Types of cracking-Moving bed catalytic cracking. LPG and CNG composition and uses.

Synthetic Fuels: Fischer Tropsch process, Introduction and applications of Hythane and Green Hydrogen.

UNIT-IV: Polymers: [8]

Definition-Classification of polymers: Based on origin and tacticity with examples—Types of polymerization - Addition (free radical addition mechanism) and condensation polymerization.

Plastics, Elastomers and Fibers: Definition and applications (PVC, Buna-S, Nylon-6,6). Differences between themo plastics and thermo setting plastics, Fiber reinforced plastics (FRP).

Conducting polymers: Definition and Classification with examples-Mechanism of conduction in trans- poly-acetylene and applications of conducting polymers.

Biodegradable polymers: Polylactic acid and its applications.

UNIT-V-Applications of Materials: [8]

Cement: Port land cement, its composition, setting and hardening.

Phase rule: Definition—Phase, component, degrees of freedom. Phase rule equation. Phase diagrams-One component system water. Two component system-Lead silver system.

Lubricants: Definition and characteristics of a good lubricant—thin film mechanism of lubrication, properties of lubricants-viscosity, cloud and pour point, flash and fire point.

Interpretative spectroscopic applications of UV-Visible spectroscopy for Analysis of pollutants in dye industry, IR spectroscopy in night vision-security, Pollution Under Control-CO sensor (Passive Infrared detection).

TEXTBOOKS:

1. Engineering Chemistry by P.C.Jain and M.Jain, Dhanpatrai Publishing Company, 2010.
2. Engineering Chemistry by Rama Devi, Dr.P. Aparna and Rath, Cengage learning, 2025.

REFERENCEBOOKS:

1. Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020).
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd.Delhi2011.
3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.
4. Engineering Analysis of Smart Material Systems by DonaldJ. Leo, Wiley,2007.
5. Challenges and Opportunities in Green Hydrogen by Editors: Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.
6. RamanSpectroscopyinHumanHealthandBiomedicine,https://www.worldscientifi c.com/doi/epdf/10.1142/13094

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, HYDERABAD

(AUTONOMOUS)

CHEMISTRY LAB FOR ENGINEERS

Course Structure & Syllabus (AR-25 Regulations)
Applicable from AY 2025-2026 Batch
B.Tech. I Year II Sem (CIVIL & MECH)

Credits distribution:

S.No	Course Name	No. of Credits allotted
1	Chemistry Lab for engineers	1
	Total credits for the Lab	1

Course Description: The course includes experiments based on fundamental principles of chemistry essential for engineering students, aiming to develop practical skills and reinforce theoretical concepts.

Course Objectives

1. Students will understand and perform experiments based on core chemical principles relevant to engineering applications.
2. Students will earn to estimate the hardness of water to assess its suitability for drinking purposes.
3. Students will acquire the ability to perform acid base titrations using instrumental methods such as conductometry, potentiometry, and pH metry.
4. Students will gain hands-on experience in synthesizing polymers like Bakelite and Nylon–6,6 in the laboratory.

Course Out comes:

1. Students will develop practical skills through hands-on chemistry experiments relevant to engineering.
2. Students will earn to determine important parameters such as water hardness and the corrosion rate of mild steel under various conditions.
3. Students will be able to apply techniques like conductometry, potentiometry, and pH metry to determine concentrations or equivalence points in acid-base

reactions.

4. Students will gain experience in synthesizing polymers such as Bakelite and Nylon-6,6.

List of Experiments:

I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.

II. **Conductometry:**

1. Estimation of the concentration of strong acid by Conductometry.
2. Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.

III. **Potentiometry:**

1. Estimation of concentration of Fe^{+2} ion by Potentiometry using KMnO4.
2. Estimation of concentration of strong acid with strong base by Potentiometry using quinhydrone

IV. **pHMetry:** Determination of an acid concentration using pH

V. **Preparations:**

1. Preparation of Bakelite.
2. Preparation Nylon–6,6.

VI. **Corrosion:** Determination of rate of corrosion of mildsteel in the presence and absence of inhibitor.

VII. Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation of viscosity of lubricant oil using Ostwald's Viscometer

VIII. Virtual lab experiments:

1. Construction of Fuelcell and it's working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand

Publications, New Delhi (2022)

2. Vogel's text book of practical organic chemistry 5thedition
3. In organic Quantitative analysis by A.I.Vogel ,ELBS Publications.
4. College Practical Chemistry by V.K.Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES (AUTONOMOUS)

(Approved by AICTE, Recognized by the GOVT. of T.S., Permanent Affiliated to JNTUH, Hyderabad)
Accredited by "NAAC" with B+ Grade, Recognized by UGC under Section 2(f) and 12(B)

Department of English

Board of studies – Second meeting on 29/08/2025

AGENDA

Item-1: Welcoming the distinguished members of the Board of studies for the BOS meeting by the Head of the Department.

Item- 2: Review / Approval of the Academic Regulation for the B.Tech Program.

Item-3: Review / Approval of the Course Structure of B.Tech Program.

Item-4: Review / Approval of the detailed syllabus of English theory.

Item-5: Review / Approval of the detailed syllabus of English Language and Communication Skills Lab.

Item-6: Any other suggestions to the Department.

Item-7: Vote of thanks.

Dr. G. Kiran Kumar

Chairperson of BOS, HOD H & S

LVV Gopala Rao
PRINCIPAL
Annamacharya Institute of
Technology & Sciences (Autonomous)
Piglipur (V), Batasingaram (Post),
Abdullapurmet (M), R.R. Dist. Hyd-501512

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
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Accredited by "NAAC" with B+ Grade, Recognized by UGC under Section 2(f) and 12(B)

Department of English

BOS Members

S.NO	NAME	DESIGNATION	POSITION
1	Dr.L.V.Venu Gopala Rao	Principal, AITS, Hyderabad	Special Invitee
2	Dr. G. Kiran Kumar	HOD, H & S	Chairperson
3	Dr. N.V.S.N.Lakshmi	Assoc. Professor of English, JNTUH UCESTH	University Nominee
4	Dr. B. Bala Nagender Prasad	Assoc. Professor, AITS Rajampet	Subject Expert
5	Dr. M. Praveena	Asst. Professor, AITS Rajampet	Subject Expert
6	B. Naga Bhavani	Asst. Professor, AITS, Hyderabad	Member
7	Ch.Sumathi	Asst. Professor, AITS, Hyderabad	Member
8	K.Venkateshwaralu	Asst. Professor, AITS, Hyderabad	Member
9	T.Manasa	Asst. Professor, AITS, Hyderabad	Member
10	B. Ashwitha	Asst. Professor, AITS, Hyderabad	Member

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Accredited by "NAAC" with B+ Grade, Recognized by UGC under Section 2(f) and 12(B)

Department of English

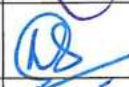
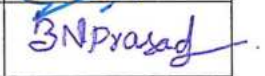
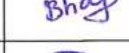
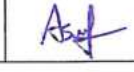
Board of Studies – Second Meeting on 29/08/2025

Minutes of Meeting

Suggestions made by **Dr. N. V. S. N. Lakshmi**, University Nominee , **Dr. B. Bala Nagender Prasad** and **Dr. M. Praveena**, Subject Experts .

1. The committee members approved AR-25 Academic Regulation for the B.Tech Program.
2. Agreed with Course Structure of B.Tech Programs:
   a. English for Skill Enhancement
   b. English Language and Communication Skills Lab
3. After the detailed discussion on JNTUH'S R-25 Syllabi of English for Skill Enhancement and English Language and Communication Skills Lab, it is decided to follow the same syllabus.

The following members attended for BoS meeting:

S.NO	NAME	DESIGNATION	POSITION	SIGNATURE
1	Dr. L. V. Venu Gopala Rao	Principal, AITS, Hyderabad	Special Invitee	
2	Dr. G. Kiran Kumar	HOD, H & S	Chair Person	
3	Dr. N. V. S. N. Lakshmi	Assoc. Professor of English, JNTUH UCESTH	University Nominee	
4	Dr. B. Bala Nagender Prasad	Assoc. Professor, AITS Rajampet	Subject Expert	
5	Dr. M. Praveena	Asst. Professor, AITS Rajampet	Subject Expert	
6	B. Naga Bhavani	Asst. Professor, AITS, Hyderabad	Member	
7	Ch. Sumathi	Asst. Professor, AITS, Hyderabad	Member	
8	K. Venkateshwaralu	Asst. Professor, AITS, Hyderabad	Member	
9	T. Manasa	Asst. Professor, AITS, Hyderabad	Member	
10	B. Ashwitha	Asst. Professor, AITS, Hyderabad	Member	

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, HYDERABAD
(AUTONOMOUS)
B.Tech. I Year I Sem & II Sem (Common to all branches)
Course Structure & Syllabus (AR-25Regulations)
Applicable from AY 2025-2026 Batch

ENGLISH FOR SKILL ENHANCEMENT

Credits distribution:

S.No	Course Name	No. of Credits allotted
1	ENGLISH FOR SKILL ENHANCEMENT	03
	Total credits for the subject	03

INTRODUCTION

National Education Policy-2020 aims at preparing students with knowledge, skills, values, leadership qualities and initiates them for life long learning. It also emphasizes language study and promotion of languages through understanding and proper interpretation. English language is central to the educational ecosystem. The importance of language as medium of communication for personal, social, official and professional needs to be emphasized for clear and concise expression. Teaching and learning of receptive and productive skills viz., Listening, Speaking, Reading and Writing (LSRW) are to be taught and learnt effectively in the undergraduate Engineering programs. Learners should be encouraged to engage in a rigorous process of learning to become proficient users of English language by adopting a deeply focused and yet flexible approach as opposed to rote learning.

In this connection, suitable syllabus, effective pedagogy, continuous assessments and students' involvement result in productive learning. This course supports the latest knowledge and skill requirements and shall meet specified learning outcomes. The main objectives of English language teaching and learning as medium of communication and for promotion of cultural values are embedded in this syllabus. Efforts are being made in providing a holistic approach towards value-based language learning which equips the learner with receptive as well as productive skills.

29/8/2025

The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed textbook for detailed study. The students should be encouraged to read the texts leading to reading comprehension. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material.

LEARNING OBJECTIVES: This course will enable the students to:

a. Improve their vocabulary.
b. Use appropriate sentence structures in their oral and written communication.
c. Develop their reading and study skills.
d. Equip students to write paragraphs , essays, précis and draft letters.
e. Acquire skills for Technical report writing.

COURSE OUTCOMES: Students will be able to:

a. Choose appropriate vocabulary in their oral and written communication.
b. Demonstrate their understanding of the rules of functional grammar and sentence structures.
c. Develop comprehension skills from known and unknown passages.
d. Write paragraphs , essays, précis and draft letters.
e. Write abstracts and reports in various contexts.

SYLLABUS: The course content/study material is divided into

Five Units.

UNIT –I

Theme: **Perspectives**

Lesson on 'The Generation Gap' by Benjamin M. Spock from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.

Vocabulary: The Concept of Word Formation- The Use of Prefixes and Suffixes-

29/8/2025

Words Often Misspelt - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Parts of Speech particularly Articles and Prepositions—Degrees of Comparison

Reading: Reading and Its Importance- Sub Skills of Reading–Skimming and Scanning.

Writing: Sentence Structures and Types -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation-Techniques for Writing Precisely–Nature and Style of Formal Writing.

UNIT–II

Theme: **Digital Transformation**

Lesson on '*Emerging Technologies*' from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.

Vocabulary: Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Reading Strategies-Guessing Meaning from Context – Identifying Main Ideas – Exercises for Practice

Writing: Paragraph Writing—Types, Structures and Features of a Paragraph - Creating Coherence—Linkers and Connectives - Organizing Principles in a Paragraph— Defining- Describing People, Objects, Places and Events—Classifying- Providing Examples or Evidence - Essay Writing - Writing Introduction and Conclusion.

UNIT–III

Theme: **Attitude and Gratitude**

Poems on '*Leisure*' by William Henry Davies and '*Be Thankful*'- Unknown Author from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Words Often Confused-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading:	Sub-Skills of Reading - Identifying Topic Sentence and Providing Supporting Ideas - Exercises for Practice.
Writing:	Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition Job Application with CV/Resume-Difference between Writing a Letter and an Email - Email Etiquette.

UNIT–IV

Theme:	**Entrepreneurship** **Lesson on '*Why a Start-Up Needs to Find its Customers First*' by Pranav Jain from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.**
Vocabulary:	Standard Abbreviations in English-Inferring Meanings of Words through Context- Phrasal Verbs–Idioms.
Grammar:	Redundancies and Clichés in Written Communication - Converting Passive to Active Voice and Vice-Versa.
Reading:	Prompt Engineering Techniques-Comprehending and Generating Appropriate Prompts - Exercises for Practice
Writing:	Writing Practices-Note Making-Précis Writing.

UNIT–V

Theme:	**Integrity and Professionalism** **Lesson on '*Professional Ethics*' from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan Pvt. Ltd.**
Vocabulary:	Technical Vocabulary and their Usage - One Word Substitutes-Collocations.
Grammar:	Direct and Indirect Speech-Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)
Reading:	Survey, Question, Read, Recite and Review (SQ3R Method) - Inferring the Meaning and Evaluating a Text-Exercises for Practice
Writing:	***Report Writing-Technical Reports-Introduction–Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format)-Types of Reports-Writing a Technical Report.***

Note: ***Listening and Speaking skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.***

- (**Note**: As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech. First Year is* ***Open-ended,*** besides following the prescribed textbook; it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on

the needs of the students in their respective colleges for effective teaching/learning in the class.)

TEXTBOOK:

1.Board of Editors. *2025. English for the Young in the Digital World.* Orient Black Swan Pvt .Ltd.

REFERENCEBOOKS:

1. Swan ,Michael.(2016).*Practical English Usage.* Oxford University Press. NewEdition.
2. *Karal, Rajeevan.2023.English Grammar Just for You.* Oxford University Press, .New Delhi.
3. 2024. *Empowering with Language: Communicative English for Undergraduates.* Cengage Learning India Pvt. Ltd. New Delhi.
4. Sanjay Kumar & Pushp Lata. 2022. *Communication Skills – A Workbook.* Oxford UniversityPress. New Delhi
5. Wood,F.T. (2007).*Remedial English Grammar* .Macmillan.
6. Vishwamohan, Aysha.(2013).*English for Technical Communication for Engineering Students.* McGraw-Hill Education India Pvt .Ltd.

Writing: Sentence Structures and Types -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation-Techniques for Writing Precisely–Nature and Style of Formal Writing.

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, HYDERABAD
(AUTONOMOUS)
ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB
B.Tech. I Year I Sem & II Sem (Common to all branches)

Credits distribution:

S.No	Course Name	No. of Credits allotted
1	English Language and Communication Skills Lab	01
	Total credits for the subject	01

The **English Language and Communication Skills (ELCS) Lab** focuses on listening and speaking skills, particularly on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Listening Skills:

Objectives

1. To enable students develop their active listening skills
2. Toequipstudentswithnecessarytraininginlistening,sothattheycancomprehendthespeech of people from different linguistic backgrounds

Speaking Skills:

3. To improve their pronunciation and neutralize accent
4. To enable students express themselves fluently and appropriately
5. To practice speaking in social and professional contexts

Learning Outcomes: Students will be able to:

1. Listen actively and identify important information in spoken texts
2. Interpret the speech and infer the intention of the speaker
3. Improve their accent for intelligibility
4. Speak fluently with clarity and confidence
5. Use the language in real life situations

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

a. **Computer Assisted Language Learning(CALL)Lab which focuses on listening skills**
b. **Interactive Communication Skills (ICS)Lab which focuses on speaking skills**

The following course content is prescribed for the **English Language and Communication Skills Lab.**

Exercise – I

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CALL Lab:

Instruction: SpeechSounds-Listening Skill - Importance – Purpose- Types-Barriers- Active Listening

Practice: Listening to Distinguish SpeechSounds (Minimal Pairs)- *Testing Exercises*

ICSLab:

- **Diagnostic Test– Activity titled '*Express Your View*'**

Instruction: Spoken and Written language - Formal and Informal English - Greetings - Introducing Oneself and Others

Practice: Any Ice-Breaking Activity

Exercise–II

CALL Lab:

Instruction: Listening vs .Hearing-Barriers to Listening

Practice: Listening for General Information - Multiple Choice Questions - *Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)*

ICSLab:

Instruction: Conversation–Strategies for Effective Communication

Practice: Role Play Activity-Situational Dialogues –Expressions used in Various Situations –Making Requests and Seeking Permissions–-Taking Leave- Telephone Etiquette

Exercise-III

CALL Lab:

Instruction: Errors in Pronunciation– Tips for Neutralizing Mother Tongue Influence(MTI)

Practice: Differences between British and American Pronunciation –*Listening Comprehension Exercises*

ICS Lab:

Instruction: Describing Objects, Situations , Places, People and Events

Practice: Picture Description Activity– Looking at a picture and Describing Objects, Situations, Places, People and Events *(A wide range of Materials/Hand outs are to be made available in the lab.)*

Exercise–IV

CALL Lab:

Instruction: Techniques for *Effective* Listening

Practice: Listening for Specific Details-Listening-Gap Fill Exercises-*Listening Comprehension Exercises*

(It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:

Instruction: How to Tell a Good Story-Story Star-Sequencing-Creativity

Practice: Activity on Telling and Retelling Stories-Collage

Exercise–V

CALL Lab:

Instruction: Identifying the literal and implied meaning

Practice: Listening for Evaluation –Write the Summary–Listening Comprehension Exercises

(It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:

Instruction: Understanding Non-Verbal Communication

Practice: Silent Speech- Dumb Charades Activity

❖ **Post- Assessment Test on 'Express Your View'**

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning(CALL)Lab:**

TheComputerAssistedLanguageLearningLabhastoaccommodate40studentswith40systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration

ii) High Fidelity Headphones

2. **Interactive Communication Skills(ICS)Lab:**

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio- visual aids with a Public Address System, a T. V. or LCD, a digital stereo —audio & video system and camcorder etc.

Note: English Language Teachers are requested to prepare Materials/Handouts for each Activity for the Use of those Materials in CALL & ICS Labs.

Suggested Software:

- Cambridge Advanced Learners 'English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.

- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL&GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).

REFERENCEBOOKS:

1. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* Cambridge University Press
2. Board of Editors.(2016).*ELCS Lab Manual: A Work book for CALL and ICS Lab Activities.*
   Orient Black Swan Pvt. Ltd.
3. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach.* Cambridge University Press
4. (2022).*English Language Communication Skills–Lab Manual cum Workbook* .Cengage Learning India Pvt. Ltd.
5. Ur, Pennyand Wright, Andrew. 2022. *Five Minute Activities – A Resource Book for Language Teachers.* Cambridge University Press.

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