ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)
I B. Tech – II Semester

S.No	Category	Course Code	Course Title	Contact Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	ES	19AES0202	Basics of Electrical & Electronics Engineering	3	0	0	3	30	70	100
2	BS	19ABS9906	Differential Equations and Vector Calculus	3	1	0	4	30	70	100
3	BS	19ABS9903	Engineering Physics	3	0	0	3	30	70	100
4	ES	19AES0502	Data Structures	3	0	0	3	30	70	100
5	HS	19AHS9901	Communicative English- I	2	0	0	2	30	70	100
PRACTICAL										
6	HS	19AHS9902	Communicative English – I Lab	0	0	2	1	30	70	100
7	LC	19ALC0302	Mechanical Engineering Workshop	0	0	2	1	30	70	100
8	ES	19AES0204	Basics of Electrical & Electronics Engineering Lab	0	0	3	1.5	30	70	100
9	BS	19ABS9908	Engineering Physics Lab	0	0	3	1.5	30	70	100
10	ES	19AES0504	Data Structures Lab	0	0	3	1.5	30	70	100
			TOTAL	**14**	**1**	**13**	**21.5**	**300**	**700**	**1000**

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

Year: I **Semester : II** **Branch of Study : ME**

Subject Code	Subject Name	L	T	P	Credits
19AES0202	Basics of Electrical & Electronics Engineering	3	0	0	3

Course Outcomes: Students should be able to
CO 1: Apply concepts of KVL/KCL in solving DC circuits
CO 2: Illustrate working principles of induction motor - DC Motor
CO 3: Identify type of electrical machine based on their operation
CO 4: Describe operation and characteristics of diodes and transistors.
CO 5: Make use of diodes and transistors in simple, typical circuit applications.
CO 6: Understand operation of basic op-amp circuits.

PART-A (Electrical Engineering)

UNIT I

DC & AC Circuits: Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.

UNIT II

DC & AC Machines: Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor [Elementary treatment only]

UNIT III

Basics of Power Systems: Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

Text Books:

1. D. P. Kothari and I. J. Nagrath - "Basic Electrical Engineering" - Tata McGraw Hill - 2010.
2. V.K. Mehta & Rohit Mehta, "Principles of Power System" – S.Chand – 2018.

References:

1. L. S. Bobrow - "Fundamentals of Electrical Engineering" - Oxford University Press - 2011.
2. E. Hughes - "Electrical and Electronics Technology" - Pearson - 2010.
3. C.L. Wadhwa – "Generation Distribution and Utilization of Electrical Energy", 3rd Edition, New Age International Publications.

PART-B (Electronics Engineering)

UNIT I

Analog Electronics: Overview of Semiconductors, PN junction diode, Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, special purpose diodes: schottky diode, tunnel diode, varactor diode, photodiode, phototransistor and LED.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

BJT construction, operation, configuration and characteristics, JFET and MOSFET construction, operation, characteristics (CS configuration), applications
Operational Amplifiers: Introduction, block diagram, basic op-amp circuits: Inverting, Non Inverting, summer, subtractor, voltage follower.

UNIT II

Digital Electronics: Introduction, Switching and Logic Levels, Digital Waveform, characteristics of digital ICs, logic gates, number systems, combinational circuits - adders, multiplexers, decoders; introduction to sequential circuits, flip flops, shift register, binary counter.

UNIT III

Communication Systems: Introduction, Elements of Communication Systems, EM spectrum, basics of electronic communication, Amplitude and Frequency modulation, Pulse modulation, Communication receivers, Examples of communication systems: Microwave & Satellite, Fibre optic, Television, mobile communication (block diagram approach).

Text Books:

1. D.P. Kothari, I.J.Nagrath, Basic Electronics, 2nd edition, McGraw Hill Education(India)Private Limited
2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2nd edition, Pearson India Private Limited.

References:

1. R. Muthu subramanian, S. Salivahanan, "Basic Electrical and Electronics Engineering", Tata McGraw-Hill Education, Reprint 2012.
2. David Bell, Electronic Devices and Circuits: Oxford University Press, 5th edition. 2008.

Note: This table also should be in portrait only

List of COs	PO no. and keyword	Competency	Performance Indicator
CO1	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO2	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO3	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO4	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO5	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO6	PO1	1.3	1.3.1
	PO2	2.3	2.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

	PO3	3.3	3.3.1

Year: I **Semester : II** **Branch of Study : CE & ME**

Subject Code	Subject Name	L	T	P	Credits
19ABS9906	Differential Equations and Multivariable Calculus	3	1	0	4

Course Outcomes:
1. Apply the mathematical concepts of ordinary differential equations of higher order.
2. Solve the differential equations related to various engineering fields.
3. Identify solution methods for partial differential equations that model physical processes.
4. Interpret the physical meaning of different operators such as gradient, curl and divergence.
5. Estimate the work done against a field, circulation and flux using vector calculus.

UNIT I
Linear Differential Equations of Higher Order: Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

UNIT II
Equations Reducible to Linear Differential Equations and Applications: Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems

UNIT III
Partial Differential Equations – First order:
First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

UNIT IV
Multivariable Calculus (Vector differentiation): Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities

UNIT V
Multivariable Calculus (Vector integration): Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

Text Books:
1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.

References:
1. Dr. T. K. V. Iyengar, Engineering Mathematics-I, S. Chand publishers
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.

3. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi publication, 2008

List of COs	PO no. and keyword	Competency	Performance Indicator
CO 1	PO1: Engineering Knowledge	1.1	1.1.1
CO 2	PO2: Problem Analysis	2.1	2.1.3
CO 3	PO1: Engineering Knowledge	1.1	1.1.1
CO 4	PO1: Engineering Knowledge	1.1	1.1.1
CO 5	PO2: Problem Analysis	2.1	2.1.3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)
Year : I Semester : II Branch of Study : ME

Subject Code	Subject Name	L	T	P	Credits
19ABS9903	Engineering Physics	3	0	0	3

Course Outcomes:
1. Explain physics applied to solve engineering problems
2. Apply the principles of acoustics in designing of buildings
3. Explains the applications of ultrasonic in various engineering fields
4. Apply electromagnetic wave propagation in different Optical Fibers and the concepts of lasers in various applications.
5. Explains the concepts of dielectric and magnetic materials and Identify the sensors for various engineering applications

UNIT I
Mechanics: Basic laws of vectors and scalars – rotational frames-conservative forces- F=-gradV, torque and angular momentum-Newton's laws in inertial and linear accelerating non-inertial frames of reference-rotating frame of reference with constant angular velocity-qualitative explanation of Foucault's pendulum-rigid body-angular velocity vector-center of mass-gravitation and Keplar's Law (Qualitative).

UNIT II
Crystallography And Ultrasonics: Crystallography – Introduction – Space Lattice – Unit Cell – Lattice Parameters – Bravais Lattice – Crystal Systems – Packing Fractions of SC, BCC and FCC. X-Ray Diffraction – Braggs Law – Powder Method.
Ultrasonics: Introduction, Properties and Production by magnetostriction & piezoelectric methods - acoustic grating-Non Destructive Testing–pulse echo system through transmission and reflection modes-A,B and C–scan displays, Medical applications.

UNIT III
Dielectric and Magnetic Materials: Dielectric polarizability, Susceptibility and Dielectric constant-Types of polarizations: Electronic , Ionic, Orientation Polarizations (Qualitative)-Frequency dependence of polarization-Lorentz (internal) field-Claussius-Mosotti equation-Applications of Dielectrics.
Introduction-Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Classification of Magnetic materials-Domain Concepts of ferromagnetism – Hysteresis – soft and hard magnetic materials-Magnetic device applications.

UNIT IV
Lasers and Fiber Optics: Introduction-Characteristics of Laser – Spontaneous and Stimulated emission of radiation-Einstein's coefficients-Population inversion-Pumping Mechanisms -He-Ne laser, Nd-YAG laser-Semiconductor laser-Applications of laser.
Introduction to Optical Fibers – Total Internal Reflection-Construction of optical fibers, Critical angle of propagation – Acceptance angle – Numerical Aperture-Classification off ibers based on Refractive index profile & modes – Propagation of electromagnetic wave through optical fiber-importance of V number-Block Diagram of Fiber optic Communication system-Medical Applications.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

UNIT V

Nanomaterials: Introduction – Significance of nanoscale and types of nanomaterials – Physical properties, optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials by Top down and bottom up approaches, ball mill, chemical vapour depositon and sol-gel – Applications of nanomaterials.

Textbooks:

1. M. N. Avadhanulu, P.G. Kshirsagar&TVS Arun Murthy". A Text book of Engineering Physics"-S.Chand Publications,11th Edition2019
2. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics", Pearson Education, 2018

References:

1. K.Thyagarajan "Engineering Physics",-Mc Graw Hill Publishing Company Ltd,2016
2. MKVarma "Introduction to Mechanics"-Universities Press-2015.
3. D.K. Bhattacharya and A.Bhaskaran,"Engineering Physics"-Oxford Publications-2015
4. IanRSinclair,Sensor andTransducers,3rd eds,2001,Elsevier(Newnes)

COs	PO no. and keyword	Competency	Performance Indicator
CO 1	PO1 : Engineering knowledge	1.2	1.2.1
CO 2	PO1 : Engineering knowledge	1.2	1.2.1
CO 3	PO1 : Engineering knowledge	1.2	1.2.1
CO 4	PO1 : Engineering knowledge	1.2	1.2.1
CO 5	PO1 : Engineering knowledge	1.2	1.2.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

Year: I **Semester : II** **Branch of Study : CE & ME**

Subject Code	Subject Name	L	T	P	Credits
19AES0502	Data Structures	3	0	0	3

Course Outcomes:
Students should be able to
1. Select Appropriate Data Structure for solving a real world problem (L4)
2. Select appropriate file organization technique depending on the processing to be done (L4)
3. Construct Indexes for Databases (L6)
4. Analyse the Algorithms (L4)
5. Develop Algorithm for Sorting large files of data (L3)

UNIT I
Introduction: Algorithm Specification, Performance analysis, Performance Measurement. Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions. Sorting: Motivation, Quick sort, How fast can we sort, Merge sort, Heap sort

UNIT II
Stack, Queue and Linked lists: Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

UNIT III
Trees: Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, Counting Binary Trees, Optimal Binary search Trees, AVL Trees. **B-Trees:** B Trees, B+ Trees.

UNIT IV
Graphs and Hashing: The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

UNIT V:
Files and Advanced sorting: File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization. Advanced sorting: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

Text Books:
1. Ellis Horowitz and Sartaj Sahni, “Fundamentals of Data Structures in C”, 2nd Edition, Galgotia Book Source, Pvt. Ltd., 2004.
2. Alan L. Tharp, “File Organization and Processing”, Wiley and Sons, 1988.

Reference Books:
1. D. Samanta, “Classic Data Structures”, 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
2. Peter Bras, “Advanced Data Structures”, Cambridge University Press, 2016.

3. Richard F.Gilberg, Behrouz A. Forouzan, "Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005.

List of COs	PO no. and keyword	Competency	Performance Indicator
CO1	PO1: Engineering Knowledge	1.4	1.4.1
CO2	PO4: Conduct investigations of complex problems	4.1	4.1.4
CO3	PO1: Engineering Knowledge	1.3	1.3.1
CO4	PO2: Problem analysis	2.1	2.1.2
CO5	PO2: Problem analysis	2.3	2.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

Year: I **Semester : II** **Branch of Study : Common to All**

Subject Code	Subject Name	L	T	P	Credits
19AHS9901	Communicative English I	2	0	0	2

Course Outcomes:

1. Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English.
2. Formulate sentences using proper grammatical structures and correct word forms.
3. Speak clearly on a specific topic using suitable discourse markers in informal discussions.
4. Write summaries based on global comprehension of reading / listening texts.
5. Produce a coherent paragraph interpreting a figure/graph/chart/table.
6. Take notes while listening to a talk/lecture to answer questions

UNIT I

Technology With a Human Face – Schumacher:

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; Introducing one self and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

UNIT II

I have three visions for India: Presidential Speech by Abdul Kalam:

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs / small groups on specific topics, followed by short structured talks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Cohesive devices -linkers, sign posts and transition signals; use of articles and zero article; prepositions.

UNIT III

The Gold Frame by RK. Laxman:

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.
Grammar and Vocabulary: Verbs -tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

UNIT IV
To be, or not to be by William Shakesphere:
Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading: Studying the use of graphic elements in texts to convey information, reveal trends / patterns / relationships, communicate processes or display complicated data.
Writing: Information transfer; describe, compare, contrast, identify significance / trends based on information provided in figures / charts / graphs / tables.
Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms.

UNIT V
The Accompanist by Anitha Desai:
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking: Formal oral presentations on topics from academic contexts -without the use of PPT slides.
Reading: Reading for comprehension.
Writing: Writing structured essays on specific topics using suitable claims and evidences
Grammar and Vocabulary: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

List of COs	PO no. and keyword	Competency	Performance Indicator
CO 1	PO6: Engineer and Society	6.1	6.1.1
CO 2	PO10: Communication	10.1	10.1.1
CO 3	PO9: Individual and Teamwork	9.2	9.2.1
CO 4	PO10: Communication	10.1	10.1.1
CO 5	PO10: Communication	10.3	10.3.1
CO 6	PO10: Communication	10.2	10.2.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

Year: I **Semester : II** **Branch of Study : Common to All**

Subject Code	Subject Name	L	T	P	Credits
19AHS9902	Communicative English Lab	0	0	2	1

Course Outcomes:

CO1: Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO2: Apply communication skills through various language learning activities.
CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4: Evaluate and exhibit acceptable etiquette essential in social and professional settings.
CO5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

UNIT I

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

UNIT II

1. JAM
2. Small talks on general topics
3. Debates

UNIT III

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

UNIT IV

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

UNIT V

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

List of COs	PO No. and keyword	Competency	Performance Indicator
CO 1	PO10: Communication	10.2	10.1.1
CO 2	PO10: Communication	10.3	10.3.1
CO 3	PO10: Communication	10.2	10.2.1
CO 4	PO 9: Individual & Team Work	9.2	9.2.1
CO 5	PO10: Communication	10.2	10.2.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

Year: I **Semester : II** **Branch of Study : ME**

Subject Code	Subject Name	L	T	P	Credits
19ALC0302	Mechanical Engineering Workshop	0	0	2	1

Course Outcomes:

CO: 1 Make moulds for sand casting
CO: 2 Develop different weld joints
CO: 3 Assemble or disassemble of machine components
CO: 4 Make plastic components
CO: 5 Use power tools and find applications of hydraulic and pneumatic circuits

I Foundry Practice: (2 Sessions)

1. (a) Determination of average grain size for sand sample using sieve shaker
   (b) Preparation of a green sand mould using single piece pattern
2. Preparation of a green sand mould using split piece pattern with core and demonstration of casting.

II Welding Practice: (2 Sessions)

i) Lap joint, butt joint and T joint using arc welding.
ii) Lap joint using resistance spot welding
iii) Lap and butt joints using gas welding

III Assembling/Disassembling Practice: (3 Sessions)

i) Bicycle
ii) Clutch and carburetor
iii) Two wheeler engine

IV Manufacture of a Plastic Component (2 Sessions)

i) Use of injection moulding machine
ii) Joining of plastic components

V Design and manufacture any two domestic utility products with any material (2 Sessions)

VI Use of Power Tools (2 Sessions)

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: Engineering knowledge	1.4	1.4.1
CO: 2	PO 3: Design/Development of Solutions	3.1	3.1.1
CO: 3	PO 5: Modern tool usage	5.3	5.3.1
CO: 4	PO 3: Design/Development of Solutions	3.1	3.1.1
CO: 5	PO 5: Modern tool usage	5.3	5.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

Year: I **Semester : II** **Branch of Study : ME**

Subject Code	Subject Name	L	T	P	Credits
19ABS9908	**Engineering Physics Lab**	0	0	3	1.5

Course Outcomes:

1. Operate various optical instruments and Estimate wavelength of laser and particles size using laser.
2. Estimate the susceptibility and related magnetic parameters of magnetic materials and plot the intensity of the magnetic field of circular coil carrying current with distance.
3. Evaluate the acceptance angle of an optical fiber and numerical aperture anddetermine magnetic susceptibility of the material and its losses by B-H curve.
4. Identify the type of semiconductor i.e., n-type or p-type using Hall effect.
5. Apply the concepts of sensors for various applications.

List of Experiments

1. Determination of wavelength of LASER light using diffraction grating.
2. Determination of particle size using LASER.
3. Determination of spring constant of springs using Coupled Oscillator.
4. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
5. Determination of Dielectric constant of dielectric material using charging and discharging of capacitor.
6. Magnetic field along the axis of a circular coil carrying current.
7. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)
8. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
9. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
10. Measurement of magnetic susceptibility by Gouy's method
11. Determination of ultrasonic velocity in liquid (Acoustic grating)
12. Determination of pressure variation using Strain Guage sensor
13. Determination of temperature change using Strain Guage sensor.
14. Determination of pressure variations using optical fiber sensors.
15. Determination of temperature changes using optical fiber sensors.

References:

1. S. Balasubramanian, M.N.Srinivasan, "A Text book of Practical Physics"-S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php-VirtualLabs, Amrita University.

List of COs	PO no. and keyword	Competency	Performance Indicator
CO 1	PO 4: Conduct Investigations of complex problems	4.3	4.3.3
CO 2	PO 4: Conduct Investigations of complex problems	4.3	4.3.1
CO 3	PO 4: Conduct Investigations of complex problems	4.3	4.3.1
CO 4	PO 4: Conduct Investigations of complex problems	4.3	4.3.2
CO 5	PO 4: Conduct Investigations of complex problems	4.3	4.3.2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

Year: I **Semester : II** **Branch of Study : Common to All**

Subject Code	Subject Name	L	T	P	Credits
19AES0504	Data Structures Lab	0	0	3	1.5

Course outcomes:

1. Select the data structure appropriate for solving the problem
2. Implement searching and sorting algorithms
3. Design new data types
4. Illustrate the working of stack and queue
5. Organize the data in the form of files

Laboratory Experiments

1. String operations using array of pointers
2. Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms.
3. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time.
4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List
5. Stack implementation using arrays
6. Stack implementation using linked lists
7. Queue implementation using arrays. Implement different forms of queue. While implementing you should be able to store elements equal to the size of the queue. No positions should be left blank.
8. Queue implementation using linked lists
9. Creation of binary search tree, performing operations insertion, deletion, and traversal.
10. Breadth first search
11. Depth first search
12. Travelling sales man problem
13. File operations
14. Indexing of a file
15. Reversing the links (not just displaying) of a linked list.
16. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using ‘Ladies first’ principle. You may create new linked lists if necessary.
17. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form.
18. A table can be defined as a collection of rows and columns. Each row and column may have a label. Different values are stored in the cells of the table. The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table. User may like to remove row/column. Create table data type and support different operations on it.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20)
MECHANICAL ENGINEERING (ME)

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering Knowledge	1.4	1.4.1
CO2	PO 2: Problem analysis	2.2	2.2.4
CO3	PO1: Engineering Knowledge	1.3	1.3.1
CO4	PO1: Engineering Knowledge	1.4	1.4.1
CO5	PO1: Engineering Knowledge	1.4	1.4.1